The RUBBER AGE

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LATE NEWS of the Industry

December Tire Shipments Gained 17% As Compared to Loss in Past Years

TIRE shipments for December increased 17 per cent above November and were 3 per cent above December a year ago, according to a special preliminary report compiled by the Rubber Manufacturers Association. This would indicate that December shipments amounted to approximately 3,325,000 casings, as compared to November shipments of 2,834,000 casings and December, 1929, shipments of 3,237,000 units.

This increase is counter to the decreases usually experienced in December as compared with November. In 1929 the decrease was 3 per cent; in 1928, 8 per cent, and in 1927, 3 per cent.

This increase is attributed by officials in the rubber industry to improvement in car production and replacement requirements for all classes of motor vehicles.

Low Mail Order Tire Prices Continued In New Spring and Summer Catalogues

COMPARISON of automobile tire prices quoted in the new 1931 spring and summer general catalogue of Sears, Roebuck & Company indicates that quotations remain approximately the same as those in the company's midwinter flyer catalogue, which represented weighted average reductions of close to 12 per cent to the lowest levels on record. Last year Sears made its usual tire price reductions in its midsummer flyer. Prices in the 1930-31 fall and winter general catalogue averaged about 5 per cent higher than in the midsummer flyer, but because of competitive conditions in the tire industry these advances over the summer levels were never put into effect, and the summer prices continued throughout last fall until the sharp December cut.

Prices on tires in the new spring and summer general catalogue of Montgomery Ward & Company also remain the same as those in the firm's midwinter sale book. Comparison of the catalogue as a whole with that of 1930 indicates reductions of as much as 20 per cent to 40 per cent under a year ago on many leading items. The average price reductions are well in line with declines in current commodity price indexes.

A feature of the Montgomery Ward catalogue is the offering of "thrift specials," one each week for 24 weeks. Between May 31 and June 6, for example, the company will sell for $2.89 its regular 50-foot molded black rubber garden hose outfit, which is priced at all other times during the year at $3.45.

Although the tire lines of the mail order houses represent their chief contact with the rubber industry, many other rubber factory products are included in their catalogues. The new 600-page catalogue of Montgomery Ward devotes many pages to rubber footwear, rubber clothing, air cushions, hot water bottles and various drug sundries, rubber belting and packing, tubing, electric tape and other items.

U. S. Rubber to Make Mail Order Tires; To Expand Samson and Gillette Plants

WITH acquisition of the controlling interest in the Samson Tire & Rubber Company in Los Angeles and in the Gillette Rubber Company, Eau Claire, Wis., the United States Rubber Company has completed a far-reaching program of expansion, according to announcement made by J. F. O'Shaughnessy, general manager of the company's tire department.

Under this plan, United States tires will be manufactured at these plants, which will be operated under the general direction of the company's tire department at Detroit. The United States Rubber Company will also become the chief supplier for Montgomery Ward & Company. Tires for distribution along the Pacific coast and the far western section of the United States will be manufactured at the Samson plant in Los Angeles, while distribution in the northwestern section will be handled by the Gillette plant in Eau Claire.

Production in all three plants will be stepped up at once, it was stated by Mr O'Shaughnessy. Within two months, he states, the Detroit plant will be operating at full capacity, and the present force of 3,500 workers increased. At the Eau Claire plant, some 12,000 casings are now being produced daily and about 1,800 workers employed. Production here will be increased and the working force increased, it was stated by Mr. O'Shaughnessy. At the Samson plant in Los Angeles, a production schedule of 6,000 casings and 10,000 tubes daily has been maintained, but this is being

increased and will be doubled before the end of the year, Mr. O'Shaughnessy said.

With the acquisition of a controlling interest in the Gillette Rubber Company, the following officials of the United States Rubber Company have been added to the directorate of the Gillette company: F. B. Davis, Jr., president of the United States Rubber Company; L. D. Tompkins, vice-president, and William deKrafft, chairman of the finance committee, all of New York. R. B. Gillette, Eau Claire, has been retained as chairman of the board.

The Samson name will be continued in Los Angeles as the Samson Tire & Rubber Corporation Division of the United States Rubber Company, with F. B. Davis as chairman of the board of directors. Other directors are: A. Schleicher, president and general manager; B. F. Schleicher, vice-president; Herbert E. Smith, J. B. Brady, E. S. Williams, secretary, and H. L. Howard, comptroller.

"The Samson plant at Los Angeles will supply not only that section of the United States west of the Rockies, but will provide shipments for the Hawaiian Islands, the Far East, all of Mexico and the west coast of South America," said Mr. O'Shaughnessy. "Its geographical situation is excellent for our purposes. Boats bringing materials from our cotton mills at Winnsboro, S. C., can take Los Angeles-made tires back through the Panama Canal to certain points in the South. In the same way ships bringing raw rubber from our plantations in Java can go back with tire cargoes. The Chevrolet assembly plant in Oakland, Calif., and the Ford plant in Long Beach, Calif., will be served by the Los Angeles factory."

Machinery is being rushed to Los Angeles for installation under the direction of F. D. Carpenter, who has been factory manager at Detroit, and who will remain in Los Angeles in charge of manufacturing operations. J. B. Magee, for years prominent in the industry in the west as Pacific coast manager of the tire department of the United States Rubber Company, has been made general sales manager for the Samson company.

Personnel at the Eau Claire plant will remain unchanged, it was stated by Mr. O'Shaughnessy, who plans to pay a visit of inspection with other officials of the company in the near future.

General Tire & Rubber Company Shows Improvement in Financial Condition

FOLLOWING the completion of the annual audit, the General Tire & Rubber Company has made public its consolidated balance sheet, as of November 30, 1930, which shows a decided improvement in financial condition over the preceding year. The statement reveals an increase in cash on hand and in banks and an increase in notes and accounts receivable, while, land, buildings, machinery and equipment are carried at a slightly lower figure than last year.

Inventory of raw material, stock in process and finished goods shows a reduction of 28 per cent at $3,834,068 as compared with $5,323,227 a year previous. This is due to lower stocks, together with a write-down of approximately $1,000,000 on raw material during the year.

Accounts payable have been reduced by about 20 per cent and there has been a reduction in the amount of notes payable to banks as compared with the year before. In spite of the depreciation of about $1,500,000 in inventory, there has been a decrease in surplus of only about $80,000 compared with 1929, the statement shows.

As previously reported, sales for the year ended November 30 totaled approximately $24,072,000 and net profits $732,597 after the inventory write-down to the extent of $1,000,000. Had it not been for the inventory write-down, earnings would have been $18.07 a share on the company's stock.

The balance sheet of the company as of November 30, 1930, compares as follows:

Assets	1930	1929	1928
*Land, buildings, etc.	$2,701,565	$2,877,089	$2,206,067
Cash	1,329,657	1,057,656	779,791
Notes and accounts receivable	4,704,598	4,109,179	5,377,086
Inventories	3,834,068	5,323,227	4,050,355
Investments and advances	2,197,214	2,076,987	.....
Patents	1	1	1
Deferred charges	51,067	92,923	19,028
Total	$14,818,169	$15,537,062	$12,432,328
Liabilities	**1930**	**1929**	**1928**
Preferred stock	$3,262,700	$3,343,400	$3,360,100
Common stock	2,112,600	2,089,975	2,066,850
Notes payable	1,950,000	2,300,000	.....
Accounts payable	387,656	473,212	694,944
Federal tax reserve	63,423	191,271	199,646
Reserve for accrued taxes, etc.	252,419	253,161	208,090
Mortgages payable	91,700	106,125	.....
Surplus	6,697,671	6,779,918	5,902,698
Total	$14,818,169	$15,537,062	$12,432,328

*After depreciation.

Goodyear Tire & Rubber Company Opens Its Tire and Tube Plant in Argentina

THE pressing of a button by President Jose Francisco Uriburu of Argentina officially started operations on January 24 in the new tire and tube factory of the Goodyear Tire & Rubber Company at Hurlingham, near Buenos Aires. The formal opening of the plant followed a long distance address from Akron by P. W. Litchfield, president of the Goodyear Company, which was heard by a group of Argentine officials and Goodyear men present at the factory itself.

In addition to President Uriburu and his aides, those who were present at the factory opening and heard Mr. Litchfield's message from Akron included Clifton Slusser, vice-president of the Akron company; A. G. Cameron, vice-president of Goodyear's export organization; Ross A. White, managing director, and Fred W. Climer, superintendent of the new Argentine plant. The factory will start operations with a capacity of 1,000 tires and 1,000 tubes daily.

The Argentine company was organized following a visit made to the South American republic in the fall of 1929 by Mr. Litchfield, who indicated at that time that he firmly believed Goodyear should increase its overseas tire and tube building output. Construction of the Argentina plant was started last July. The factory will employ about 400 people.

The new tire factory of the Goodyear Tire & Rubber Company near Buenos Aires

McClaren Rubber Company Reorganized To Operate Business With New Capital

THE McClaren Rubber Company, which has been operated since December, 1927, as a subsidiary of the Ajax Rubber Company, has been reorganized at Charlotte, N. C., and has been refinanced with local capital. Tire production at the McClaren factory at Charlotte was scheduled to be increased to 1,000 casings a day at the end of January, as compared to 850 a day in the previous week and 500 a day earlier in the month.

Announcement of the plan to refinance the McClaren company was made by I. Eisbrough, formerly of Racine, Wis., who is acting as vice-president of the new company. P. J. Mayle, formerly of Racine, was elected secretary and H. McRose, treasurer. Named on the board of directors were Mr. Eisbrough, Norman Cooke, Lee A. Fogler and C. A. Cochran, Charlotte; W. T. Smith, New York; J. L. McNair, Laurinburg, N. C., and H. H. Wolf, Chicago. The election of a president was deferred.

Previously at a stockholders' meeting last month an amended charter was voted with a capitalization of 5,000 shares of Class A preferred, 1,000 shares Class B preferred, and 100,000 shares of no-par common stock. In addition to the stock purchased January 15 at the forced sale of 5,000 preferred and 17,991 common shares, pledged as security by the Ajax Rubber Company before it failed to meet its obligations, the company already has underwritten at the present time a capitalization of $375,000. The capital investment will later be about $1,500,000, it was announced.

The McClaren Rubber Company succeeded the old J. & D. Tire Company, incorporated in 1916. Its merger with the Ajax Rubber Company was completed in December, 1927, with H. L. McClaren becoming president of the combined companies. The Ajax company acquired the 12,000 common shares of the McClaren company through an exchange of ten shares of Ajax common for each share of McClaren. The 5,000 shares of McClaren preferred stock was paid for in five-year 8 per cent notes with stock purchase warrants.

Two months ago it was annonuced that the Ajax Rubber Company was defaulting in payment of interest due December 1 on its $1,517,000 outstanding first mortgage bonds.

Ford Motor Company Denies Intention Of Ending Rubber Planting in Brazil

OFFICIALS of the Ford Motor Company on February 2 denied emphatically a news dispatch from Para to the effect that the 6,000,000-acre rubber growing concession on the Tapajos River would be abandoned. The original statement declared that the Ford interests had found the undertaking impracticable because of native antagonism to North American methods of efficiency.

The Ford officials, however, said that "nothing has transpired to change the prospects of the developing of the rubber plantation or to change the program." They further asserted that "rumors on which the report was based have their origin outside the actual events and conditions at the plantation."

In the dispatch it was stated that American circles in Rio de Janeiro understood that Mr. Ford believed he had a federal concession for the rubber plantation, whereas it was only a state concession.

"That is absolutely untrue," the Ford officials declared. "While the concession was made by the State of Para, it required and did receive formal federal sanction before Mr. Ford undertook any operations."

The dispatch had stated that the employes on the Ford grant had been reduced from more than 3,000 to only 200, while some have resigned and others have been assigned to Australia. This was also flatly denied, the spokesmen for the Ford Company stating that 3,000 employes are still at work on the plantation.

"There is no thought of withdrawing," the officials concluded, "nor any event to encourage withdrawal. The fact is that work toward completion of the project is progressing at this moment ahead of schedule. Within less than three years since the concession was acquired more than 3,500 acres of jungle have been cleared and nearly two-thirds of that acreage has been terraced and drained for planting. In the same time more than 140,000 seedlings have actually been set out and a nursery with upward of 200,000 seedlings has been developed in readiness for planting as additional acreage is terraced and drained.

"Our official reports from Boa Vista, the plantation headquarters, show that major installations, such as powerhouse, saw mill and filtration plants, are practically completed and that the construction of other buildings on the project, including foremen's houses, laborers' dwellings, a permanent hotel, school and other structures is continuing as originally planned. Representatives of the company are expected to arrive in Para in a day or two with plans to further speed the work."

B. F. Goodrich Company Report Shows Net Loss of $8,400,000 During 1930

FOLLOWING the regular quarterly meeting of the board of directors of the B. F. Goodrich Company on February 4, a preliminary financial statement was issued, showing a net loss for the year ended December 31, 1930, of approximately $8,400,000 after all charges including interest and depreciation. This compares with net profit for the previous year, including Hood Rubber Company for four months, of $7,446,310.

Consolidated net sales of the company for the past year were approximately $155,000,000 as compared with sales of $164,494,957 in 1929. Inventories of raw materials were taken at the lower of cost or December 31 market prices. The year's operations were charged in creating a reserve to write down raw materials on commitment to December 31, 1930, market prices. The directors also ordered a charge of approximately $1,800,000 against surplus account in order to write the cost of the material content of in-process and finished goods to market prices as of the end of the year. This represents a departure from past policy of carrying materials in finished goods at cost. The entire cost of issuing the $30,000,000 15-year 6 per cent convertible gold debentures was also charged against surplus.

Operations of the Miller Rubber Company, Inc., were consolidated in the year's results only during the period from February 17, 1930, during which time it operated as a subsidiary of the B. F. Goodrich Company.

The preferred dividend of $1.75 per share was declared, payable April 1 to stockholders of record at the close of business on March 13. The directors also approved the retirement of 11,880 shares of preferred stock in accordance with the provisions of the company's charter.

Despite the large loss indicated, the balance sheet of the B. F. Goodrich Company as of December 31, 1930, is expected to reveal the company in strong fiscal condition. Bank loans, which totaled $13,025,696 on June 30, last, were entirely liquidated before the end of the year. The company's cash balance at the close of the year was substantial. The ratio of current assets to current liabilities was highly satisfactory, and the working capital position was wholly adequate.

(Other news of the industry will be found on Pages 467-473)

Litchfield Answers Critics of Industry

He Reviews the Difficulties Which Have Lead Up to the Present Unfortunate Situation Existing Within the Industry and Contends the Present Acute Competitive Conditions Cannot Be Avoided

EDITOR'S NOTE: *It is not often that the leading executives in the rubber industry speak out as frankly and strikingly on the subjects of price cutting, the rights of the stockholders and the public interests involved as does P. W. Litchfield, president of the Goodyear Tire and Rubber Company, in a recent statement to the press, which is reproduced below:*

SELDOM in the history of business has an industry met the criticism that it made its goods too well or sold them at too low a price. And yet the charge has been made of late that the rubber industry, by cutting prices, has reduced profits that should go to its stockholders. And occasionally the second statement appears that the many improvements in quality have given automobile tires so much longer mileage that the replacement market is thereby reduced and consequently stockholders' interests are impaired.

Let me point out that no company sells its goods at less than it can reasonably get for them. A corporation is in business to make money. That it should willingly accept small profits or no profits when a fair and substantial income is available for the taking is unthinkable.

Beyond the fact of lower priced rubber and cotton the basic reason for the decreases in tire prices since October, 1929, is an excess of factory capacity. That condition has existed before, will exist again. And presently, after a breathing spell the demand for tires will catch up with supply.

The number of people who own stock in industrial corporations has grown by leaps and bounds. Twenty years ago less than 100 people owned practically all of the stock in the Goodyear Tire and Rubber Company. Today it is owned by approximately 60,000 people. The close contact with the company's activities and problems which was possible to stockholders then, is impossible today. A similar situation exists in the case of most large companies. Consequently some clarification of the situation may be useful.

The difficulties of the rubber industry in depressed times are no different from those of other industries, except perhaps in degree.

Rapid Growth of the Industry

Conditions inherent in the business make it somewhat more subject to ups and downs than some other lines of business. For example, crude rubber, the most vital factor as affecting profits, must be transported half way around the world. Nearly one-third of the year's inventory consequently is carried on the company's books at all times, as the cycle between contracting for crude rubber in Sumatra and collecting the money from the same of tires made from that rubber, covers nearly four months.

Coupled with the matter of large inventories is the fact of wide fluctuations in the price of rubber. Selling at 55 cents a pound in 1914, it dropped as low as 12 cents in 1921, rose to $1.21 in 1925, today is about 8 cents. A rising market brings difficulties in financing purchases. A falling market means large inventory write-offs.

Again, is the circumstance that no industry grew faster than rubber during the period 1910-20. With the dynamic growth of the automobile industry, the public was demanding more rubber tires than existing factories could turn out. Demand exceeded supply. And when this happens prices and profits inevitably rise.

The situation invited competition and competition came. The number of companies making tires increased in the ten years from seven to 200. Companies started up which could not possibly survive under any but abnormal conditions. And the depression of 1920-21 drove many of these under-financed, inexperienced, weaker companies to the wall and created intense competition among those who remained.

Turn to 1930 and you will find a repetition of the story of ten years before. The factory capacity of 30,000,000 tires per year, which had been excessive in 1921, became too small when business righted itself. Tire business more than doubled in the decade. In 1928 and in 1929 some 74,000,000 tires were sold and factory capacity had been expanded to meet that demand.

Competition is Necessarily Acute

Now for the time being that factory capacity is again excessive, and will be for a time. The industry sold 55,000,000 tires last year. Idle machines are expensive. Overheads are less flexible than sales totals. Fixed charges have a tendency to remain fixed, even though income to pay them is reduced. And so again competition for what business is available becomes acute.

The tire industry has done its part to extend the use of automotive vehicles and so widen the market for automotive goods—including its own. The fact that car registration increased from 9,000,000 in 1920 to 27,000,000 in 1930, was due to many factors. But since tires form one of the larger expenses of car ownership, the fact that one could get twice as many miles in 1930 as he could in 1920 out of a tire that cost half as much—this was certainly one factor.

And this, in my judgment, is the real answer to the curious criticism that tires have been made too well. Statistics show clearly that the policy of maximum quality is a sound one from the standpoint of the stockholders.

The Goodyear company did not believe that the price cut made recently by the industry was justified by production costs, since unit costs rise as volume falls off. It doubted whether the cut would stimulate buying. Tire prices were already 75 percent below pre-war costs, whereas commodities generally were 20 percent above 1914 prices. There was no public demand for lower priced tires.

Nor would a company initiating a price cut reap an individual advantage from it, since obviously every one of its competitors would meet the new schedule. They must do that or see their business taken from them.

For any company to keep its own prices high with the thought of earning a larger profit per tire and thereby increasing returns to the stockholder, would be to grasp at a temporary advantage at the expense of the corporation itself. The result would be to lose business and so impair the value of the stockholders' investment. Directors of a

(*Concluded on page 60*)

Modern Rubber Laboratory Serves English Trade

Rubber Service Laboratories Company of Akron Through Its English Affiliate Operates First Complete Private Testing Laboratory in England—Serves to Control Quality and Uniformity of Products, to Develop New Materials and to Study Applications of Materials to Needs of Customers

THE rubber laboratory opened recently at Ruabon, North Wales, England, by the Graesser-Monsanto Chemical Works, Ltd., a division of Monsanto Chemical Works, St. Louis, Mo., and the British affiliate of Rubber Service Laboratories Company of Akron, Ohio, has aroused considerable interest not only because of the completeness of equipment and testing facilities, but also because it is the first laboratory of its kind operated in England by any producer of rubber chemicals and compounding materials.

The service of this laboratory is offered to rubber manufacturers so that their products may meet every need of industry. The day of rule-of-thumb methods has disappeared and in their stead, the rubber chemist and physicist have introduced scientific methods in the manufacture of rubber goods. To make the latest advances of rubber technology available to rubber manufacturers is one of the main functions of progressive manufacturers of compounding materials and with this in mind, the Rubber Service Laboratories, through Graesser-Monsanto, have established their laboratory so that the rubber industry of England and the continent may know the latest developments and uses of the company's products, which include many well-known accelerators, anti-oxidants and softeners.

The laboratory layout is shown in the accompanying floor plan (Figure 1). It comprises approximately 1,200 square feet of space arranged so that each testing operation follows in logical order without any waste motion. The equipment used is automatic where possible and complete recording instruments tell the story of what is happening at all times.

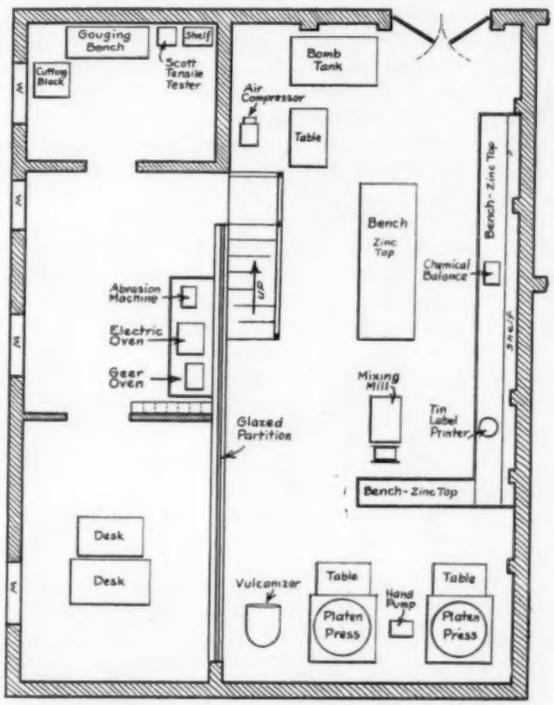


Fig. 1.—General Floor Plan Showing Location of Equipment. Total Floor Area Approximately 30 x 40 Feet

Mixing

The laboratory size experimental mixing mill is shown in Figure 2. This is in every respect a small size duplicate of an ordinary works mill and every operation necessary in the factory can be carried out on this miniature size mill.

It is equipped with a safety brake operated by the rod overhead, which will stop the mill almost instantly. The rolls are provided with steam or cold water as conditions warrant. The equipment has an individual electric drive with an automatic overload controlled motor which permits of a heavy overload for a short period of time or a light overload for a longer period of time without breaking the circuit.

Press Vulcanization

The hydraulic press equipment used for ordinary vulcanization work is shown in Figure 3. Each platen of the presses has its own individual mercury thermometer and its own direct steam supply and condensation outlet, making it unnecessary for the steam to pass through the two upper platens in order to reach the lowest one.

The molds in use are of such size that they do not come nearer than 4 inches from the outer edge of the platens. The hydraulic equipment is designed for working pressures up to 3,000 pounds per square inch, though ordinarily from 500 to 1,500 pounds is used, depending upon the area of mold carried between the platens. Low pressure water supply of about 65 pounds from the ordinary mains is used to operate the presses up to the closing point and the high pressure is obtained by use of the hand pump located between the presses. This pressure is easily maintained over a cure of six to eight hours without touching the equipment.

The temperature control is automatic and recording

thermometers give written record of the temperature at all times.

Other Types of Vulcanization

The open steam vulcanizer is shown in Figure 4. It has a quick acting door of what appears to be an ordinary open steam vulcanizer. This is jacketed so that steam may be carried either in the jacket or in the inner chamber, thus permitting an open steam cure or pan cure if steam is in the inner chamber and also permitting of a hot air cure if steam is admitted only to the jacket. A circulating fan is mounted on the rear of the vulcanizer to maintain circulation of the air inside the heater. This air may be maintained under pressure so as to duplicate the factory condition utilized when vulcanizing footwear under the usual air pressure from 20 to 35 pounds per square inch. The temperature control is automatic and a recording thermometer registers the details of temperature. This dual instrument is shown directly over the vulcanizer.

Tensile Strength Determination

Figure 5 shows the Scott tensile strength machine and auxiliary equipment used to determine the tensile strengths and stress strain curves of vulcanized samples. On this machine one man is able to obtain data for stress strain curves. He holds in one hand the ruler to measure the elongation of the sample and at each 100 per cent elongation presses a small electric button, which by means of a jump spark arrangement burns a small hole in the paper diagram shown on the top of the machine. After the test piece is broken, a record is copied of the actual pounds pull for each one of the burned spots on the paper chart. By shortening the radius of the sparking arm a large number of test pieces may be run using the same chart. The die and mallet used for stamping out the test specimens are shown at the left. The die is always wet with water and two or more layers of cardboard are held under the rubber sheet.

Hot Air Aging

One of the electrical ovens as well as the Williams type abrasion machine are shown in Figure 6. The automatically controlled electric oven is used for aging of rubber samples according to the Geer oven test.* The samples are suspended from the rotating shelf while the temperature of the oven is maintained at 70 degrees C. plus or minus ½ degree. The shelf rotates about thirty times per minute, but this may be regulated to suit the conditions required. This rotation insures uniform temperature for all samples as well as agitating the air within the oven.

Abrasion Testing

The abrasion testing machine shown is described in the publication by Williams.† This equipment is as originally designed by Williams with the exception that the Prony-brake arm has been counter-balanced and thus eliminates the correction necessary for the weight of the arm. A continuous current of air at 30 pounds pressure blows on the sandpaper disc to keep it clean and free from all rubber dust. Otherwise the machine is operated as originally described.

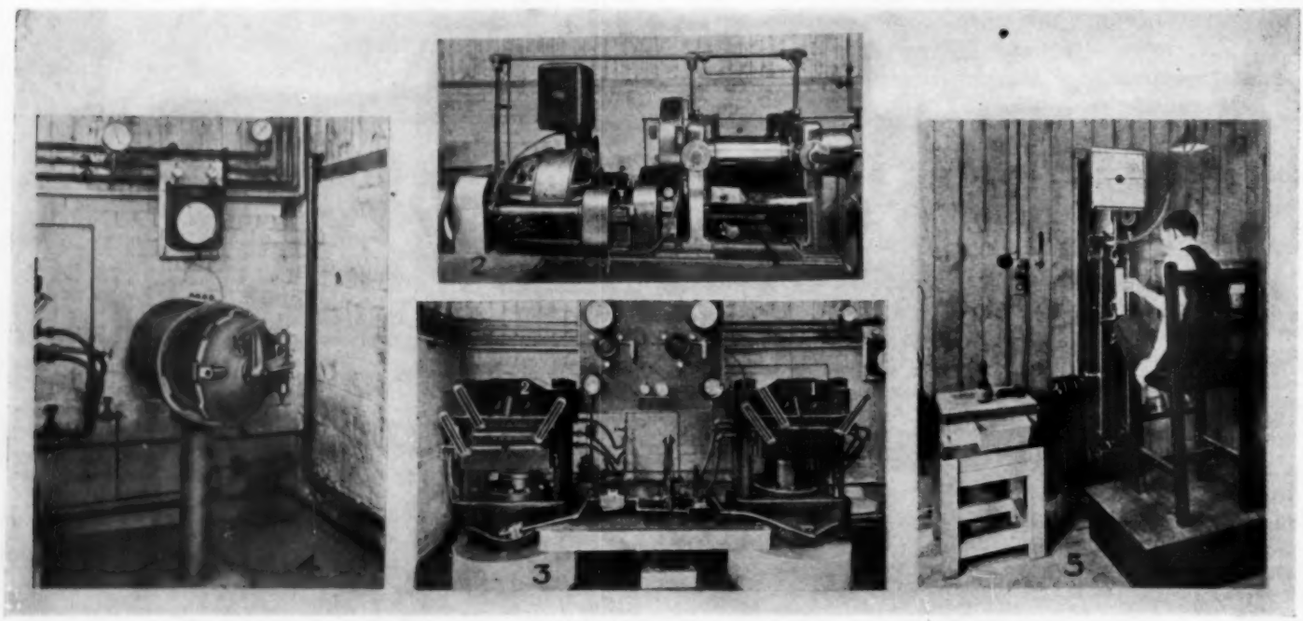
Flexing Test

Figure 7 shows one of the flexing machines used to determine the flexing properties of rubber. This machine is a product of the company's own laboratories, the basic idea being derived from a machine of a somewhat similar type by the India Tire and Rubber Company, described in the *India Rubber World*, July, 1929. This is a comparative test machine and absolute values are not relied upon. Each of the four wheels shown has slots for twelve samples and these may contain from three to six pieces of the compound to be investigated and compared directly to the same number of pieces of a standard or known compound, which is mixed, vulcanized, etc., under identical conditions with the compound under investigation.

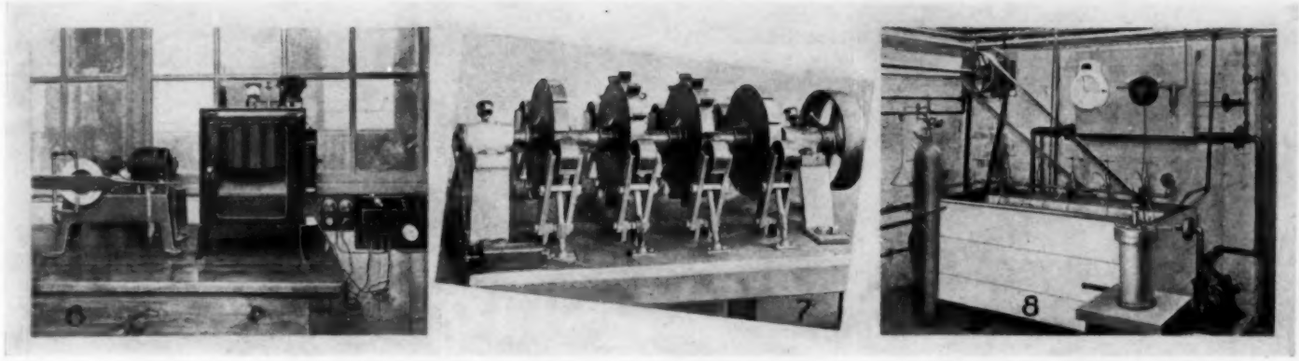
This machine operates at about 600 r. p. m., giving some 1,200 flexes to the samples per minute. The small rubber

*Geer Oven Aging Test, THE RUBBER AGE, New York, Vol. 11, 345 (1922).

†*Industrial and Engineering Chemistry*, 19, 675 (1927).



Figs. (2) Experimental Mill, (3) Platen Presses, (4) Open Steam and Hot Air Vulcanizer, (5) Scott Tensile Strength Testing Machine



Figs. (6) Abrasion Testing Machine and Hot Air Aging Oven, (7) Flexing Machine, (8) Oxygen Bomb Aging Equipment

pieces, extending from the steel discs, have small grooves molded in them so that flexing always takes place at exactly the same positions. Observations are made at regular periods and records are obtained showing when slight surface checking begins, when these small checks gradually grow into deeper cracks, and when these deeper cracks extend through the rubber Normally, the rubber compounds will stand from two to ten million flexes in a machine of this type; this test occupying roughly from one day to a week. A revolution counter showing the number of flexes is shown at the left-hand side of the machine.

Oxygen Bomb Aging

The oxygen bomb testing equipment, well-known to the rubber industry, is shown in Figure 8. This equipment is operated normally at 70 degrees C. and 300 pounds oxygen pressure, which is a slight variation from the original specifications. In the equipment shown there are five of the bombs, one being outside in a position to be unbolted. Each is supplied with oxygen under the proper pressure by the manifold line shown in the photograph. The bombs are carried under water, the temperature of which is controlled automatically and which is steam heated and circulated by a centrifugal pump shown at the right. The water is in mild agitation by the pumping action and the temperature variation is less than one-tenth of 1 degree C. Oxygen is supplied from the ordinary commercial cylinders, one of which is shown on the left of the photograph.

Chemical Industries Exposition

FOUR HUNDRED AND FIFTY or more exhibits will fill the three floors of Grand Central Palace, New York City, when the 13th Exposition of Chemical Industries opens the week of May 4th to 9th. These displays will illustrate scores of phases and ramifications of the industries that are dependent in their operations upon a chemical change in the nature of the material, or are under chemical control. Among the numerous layouts will be raw materials, chemicals, machinery, boiler room equipment, including refractories, gauges, automatic control and other precision instruments, and laboratory equipment, besides a list of equipment and supplies hardly to be classed under any of the foregoing heads.

Besides the chemical products and machinery and equipment of interest to rubber factory executives which will be exhibited, a number of rubber products and new developments in equipment using rubber will be shown, such as the following: acid resisting materials, barrels, drums, battery parts, chemical plant equipment, food industry equipment, insulating materials, pipe fittings, plastics, pumps, tanks, rubber products equipment, valves and fittings, baskets, rubber lined tanks and cars, conveying machinery, flooring, transmission equipment and belts.

Rubber Paving at the Seaside

THE town Council of Hastings, England, have recently authorized the paving with rubber of a large section of the seaside promenade. The project will cost £49,240. It is proposed, however, to test the suitability of various rubber surfaces before proceeding with the whole scheme. Work is expected to start in October.

"Cheaply Black"

THE foreign rubber trade press has been devoting considerable space to descriptions of a new mineral lampblack for rubber mixtures which has recently been developed by the Nordbayrische Farben und Lackindustrie, G. m. b. H., of Hof an der Saale. This mineral soot is being obtained from their own deposits and is being marketed under the trade name "Cheaply Black."

It is a grayish black, very fine mineral black of specific gravity 2.2 to 2.3, and is claimed to possess all the properties characteristic to the finer grades of carbon black in rubber compounding. As reported by Dr. Rudolph Ditmar in *Le Caoutchouc et la Gutta Percha*, September 15, 1930, "Cheaply Black" incorporates in rubber mixtures with rapidity, dusts less than synthetic soot, is compatible with all accelerators, activators and preservators.

In accordance with its name it is reported to be selling at a price far below that of any other black in the rubber compounding field.

Rubber Enamel

A NEW enamel containing a rubber base has made its appearance in England under the name of Steelcote and is marketed by H. A. Moore and Company, London. It is claimed to be impervious to all weather conditions and will not show brush marks, blister or crack. The makers also claim that it is the only enamel of which the basic constituent is pure Para rubber. The presence of rubber makes it so elastic in its application that the bending or folding of a sheet of metal so treated is said to not damage the smooth finish.

Egypt's Tire Trade

EGYPT, with its 14,000,000 or more inhabitants and its 28,000 motor vehicles, is the largest and best market for automobile tires in North Africa. In the absence of local manufacture of tires, the country is dependent upon imports for its entire consumption. These imports approximate utilization, inasmuch as re-exports to nearby markets are almost negligible. The trade competition is keen, at least twenty-two makes being represented, of which no less than twelve come from the United States.

The automobile is becoming each year more and more popular in Egypt, and as imports continue to increase the country will offer a more lucrative field for United States tire manufacturers, despite the present apparently overcrowded condition of the market.

United States tires are recognized for their superior qualities, and though the larger companies are well entrenched in the public mind, the smaller companies are laying foundations for the future, regardless of the adverse economic and financial situation now prevailing throughout Egypt as a result of the world-wide depression.

The consumption for the year 1930 reached probably about 65,000 units, with a sale value of approximately $1,300,000.

American Tires Popular

Tires bearing trade names of United States manufacturers are popular on the Egyptian market but are supplied not only by factories in the United States but by subsidiary plants in Canada, France, and the United Kingdom. The most popular make on the market is a tire well known in the United States, which enters Egypt by the way of Trieste, Italy, where the company maintains a warehouse, stocking tires from its factory in the United States as well as Canada and the United Kingdom. Another tire equally well known in the United States comes largely from its British plant, although some shipments are still sent from its American factories. Still another tire, popular in America, is supplied almost wholly from its plant in France. Thus, many tires sold to the Egyptian public by trade names connected with the United States manufacturers are not actually produced in the United States but in foreign countries.

As a result of this condition, direct shipments throughout 1930 from the United Kingdom exceeded those of the United States. Included in the British imports, however, is the universally known make of Dunlop—a strictly British product, financed by British capital.

Italy continues to be the second principal supplier, contributing mostly the Italian Michelin make, produced at Turin by the French company, and the strictly Italian brand of Pirelli. The third supplier is France, exporting the Michelin tire from the parent plant in southern France, French Goodrich, and Bergougnan.

Rubber Flooring Markets

WITH the idea in mind, that with improved manufacturing methods and lower rubber prices new possibilities might be opened up for the export of rubber flooring, the Department of Commerce recently conducted an investigation through its various foreign offices, to determine the extent of the market in this commodity. The reports received indicated that a wide potential market existed but stressed the point that much lower prices must prevail before rubber flooring will be able to compete successfully with other forms of floor coverings.

That attempts are being made to remedy this situation is evident from recent trends. In 1929 the United States production of rubber flooring was valued at $0.46 per square foot, as compared with $0.51 in 1927, and it may be assumed that 1931 will witness still further reductions. The Pirelli Company, of Milan, the important Italian producer, is reported to be contemplating a 30 per cent reduction in June, 1931. Prices in the United Kingdom have come down considerably and still lower prices for this year are expected.

While the greatest development in rubber flooring abroad has taken place in the United Kingdom, considerable progress has also been made in Italy, Germany and Japan. Sweden and Norway also have local factories now making rubber flooring in volume.

The Department of Commerce called attention to the fact that foreign specifications for rubber flooring manufacture, together with samples and illustrated catalogues from foreign firms can be loaned from the Rubber Division to interested parties.

Fellowships in Rubber Chemistry

THE University of Akron is offering three graduate fellowships in the study of rubber chemistry, during the academic year 1931-32, to students of other colleges who have shown outstanding ability in the fields of chemistry during their undergraduate work.

These fellowships pay $1000 each and exempt the holder from all fees and deposits. The fellowships are made possible this year through contributions from the Goodyear and Firestone rubber companies. It is possible to complete the work for a Master's degree while holding one of these fellowships.

Litchfield Defends Industry

(*Continued from page* 456)

corporation must safeguard the long-time values built into it and not act on motives of temporary expediency.

An alternative that has been actually suggested in public prints that the various companies should get together and fix prices, agreeing among themselves to hold them at a certain level, is equally out of the question. Our whole system of business in America is based on the theory of free competition. An agreement to fix prices would not merely be unenforcible, in case of a lapse on the part of any party to the agreement, but would be contrary to law and subject to prosecution.

When we speak of the rubber industry, too, we may not think of it as a single integral unit. There are some thirty-five separate, independent tire companies. Any action respecting prices by the larger companies, or even by very large distributors of tires affects the whole group and must be taken into account. Each of these corporations is free to act in whatever way it believes is to its own interests. The leading companies may exert a wholesome influence toward stability in the industry. They can do no more than that.

There is nothing mysterious or strange or new about the present method. The causes are easily seen and traceable. Economic forces are working themselves out as they have done before. Good times built up the forces that brought on bad times, and bad times will clear the deck for good times again. The years 1930-31 are preparing the way for prosperity, just as 1928-29 laid the foundations for adversity.

Courage, patience and hard work—these are the things that will bring us through the present difficulties.

Carving a MEMORIAL *in* HARD RUBBER

How the Dunlop Tablet Recently Unveiled in Belfast Was Made From a Solid Block of Ebonite

The Dunlop Memorial Tablet in Its Finished State

A UNIQUE feature of the John Boyd Dunlop Memorial, unveiled in Belfast, Ireland, December 9, 1930, is that the tablet is made from one solid block of ebonite. The memorial is erected on the wall of the premises where the first pneumatic tire was made by Dunlop and was presented to the city of Belfast by the Dunlop Rubber Company, Ltd. The following description of how the memorial tablet was made is reprinted from the *India Rubber Journal,* to which acknowledgment is herewith made.

The ebonite block itself was manufactured at the Macinlop factory of the Dunlop Rubber Company, Ltd., and the carving was done by an eminent firm of architectural sculptors, Earp, Hobbs & Miller, of Manchester. Close cooperation between the two firms was imperative, because no sculptured work in ebonite had ever been attempted before on anything like such a scale, and previous experience was, therefore, lacking. From the sculptor's viewpoint it was essential that the ebonite should be capable of being freely cut without shatter or cracking, and offering possibility of good sharp finish; perfectly sound throughout, without porosity, blowholes, or laminations; homogeneous and uniform in all parts, not varying in density, consistency or color from place to place; and flat, maintaining its flatness under all required conditions.

Problems in Manufacturing the Block

The problem was to manufacture at the first attempt the bulky block of material satisfactorily meeting all requirements. The block itself as eventually presented to the sculptor was 4 ft. long, 2 ft. 6 in. wide, 6 in. thick at the deepest part, and weighed no less than 270 pounds.

First, the formula for the ebonite compound was carefully worked out by the technical staff at Fort Dunlop, and by experiment the manufacturing precautions necessary were determined between the two Dunlop factories concerned.

The unvulcanized ebonite compound was run out into thin layers. These layers were built up one upon the other, and as each ply was added to it was thoroughly rolled down with a roller weighing 500 pounds, so as to exclude all air and secure maximum adhesion between the layers.

The block built up in this way was trimmed to fit a special steel mold and placed in a hydraulic press which closed with a pressure of 1,200 pounds per square inch on a 24-inch ram, or nearly 250 tons. Here it was given a preliminary cure, the temperature being gradually raised for 12 hours, kept constant for 36 hours, and cooled off for 6 hours.

The block was then removed for examination. As far as could be seen, it was quite sound, without lamination or blowholes, so it was decided to proceed with the vulcanization. For this purpose, it was returned to the mold, and after five hours' gradual rise of temperature, it was "cooked" for a further period of 52 hours. Thus the complete vulcanizing process required over 110 hours.

After removal from the mold the block was placed on a flat surface and held down by weights to insure that during contraction and cooling it would remain as flat and straight as it was possible to ensure.

On final examination the hardness was found to be correct, and what is probably the largest block of solid ebonite ever made was thus successfully completed, and handed over to the sculptor.

Previous experiment by the sculptors made on various samples had indicated that from the artistic point of view the material was so "reasonable" that very small work as in fine ivory carving, or, on the other hand, large scale work could be done with equal facility. Therefore, practically any carving on it could be done with every confidence and by the usual methods current in the sculptor's art, and it was found as work proceeded that the block was perfect throughout.

Special Technical Difficulties

There were, however, certain special difficulties of a technical nature, the solution of which had to be thought out, and for which specific apparatus had to be developed.

In the first place, the tire had to be "turned" so that it was truly circular. An approximate circle would not do. This was done by making and fixing into position on the ebonite a vertical stem carrying a horizontal arm on which was fixed a vertical adjustable slide rest, with shaping tools specially forged for the purpose. The arm centered on the vertical stem and a self-aligning ball race enabled a sufficient range of movement to be obtained. When all

was correctly set at the proper radius, the whole arrangement was revolved by hand. The tool gradually cut the ebonite away to approximate shape and to a depth previously determined and limited by a stop. By this means a truly circular plain tire was cut, which was afterwards divided up and the tire pattern carved by hand.

The next problem was the lettering. After careful marking out, the letters were cut by means of minute "burrs" such as those used by dentists preparing teeth for filling. The "burr" in this case was about the size of a pencil point and had six microscopic cutting edges like a milling cutter or end mill. By means of a high speed drive through a flexible shaft, it was found that a cut of full depth could be taken and the provision of a special guide which both prevented the cutter from rolling and acted as a depth gauge, each letter was very soon isolated. The final tuning up and trimming was done by hand.

The six ornamental bosses on the memorial tablet are really caps covering cavities in which are the heads of the fixing bolts to attach the slab to the wall of the building. They are actually screwed in, so that at any time the memorial can be removed if required For this purpose it was necessary to cut an internal full screw in six holes, each 1½ in. diameter and only ½ in. deep. It was soon seen that ebonite is not strong enough to pull forward a large diameter tap in so shallow a hole, without breaking the thread. A special tubular tap with serated bottom edges was made, and a tapped metal plate with back nut was clamped accurately in position vertically over each hole. The tap was fed through the nut, and was carried forward by it, instead of by the thread being formed. A perfect thread was cut at a single operation, and all shavings escaped freely to the inside of the tubular tap. The threads on the outside of the patterns were turned in the lathe, and each one screwed in perfectly flat.

Measures Taken to Prevent Warping

To insure flatness, the sculptors found it desirable to remove ⅛ in. to ¼ in. from the back of the block in order to see whether the exposure of fresh surfaces by carving disturbed the balance of stresses in the interior. It was found that it did, and that after two days' settling warping took place in sufficient degree to necessitate further carving to reflatten the back. After this was done, there was no further trouble, although as an additional precaution the tablet during working was always resting on a large slab of marble 2 in. thick which could not bend.

The relief portrait, practically life size, presented no special difficulties and was carved out by an artist by methods well known to the craft. The basis was a small portrait of J. B. Dunlop and from this a full size clay model was developed. A bold and lifelike portrayal was secured by this means, and from the model the necessary "pointing off" to the ebonite block was done. By drilling down a series of holes in the ebonite at the points marked, the main portions of the features were located, and the rest was a matter of clever work on the part of the artist concerned.

The weight of the finished memorial was 200 pounds. The inscription on the tablet is as follows:

JOHN BOYD DUNLOP

Born February 5, 1840
Died October 23, 1921
Member of the Royal College of Veterinary Surgeons. Practising in this City. Inventor and Patentee of the Pneumatic Tyre in 1888.
The purchase of this invention and the subsequent development by the Dunlop Rubber Co., Ltd., inaugurated one of the largest industries in the World.
This Tablet erected A. D. 1930.

Market for Tires in Uruguay

URUGUAY, with its almost 50,000 motor vehicles, offers more opportunities to tire exporters than do other countries of South America, with the exception of Argentina and Brazil. On January 1, 1930, the country had 36,100 passenger cars, 875 busses, and 9,000 trucks, making a total of 45,975 motor vehicles.

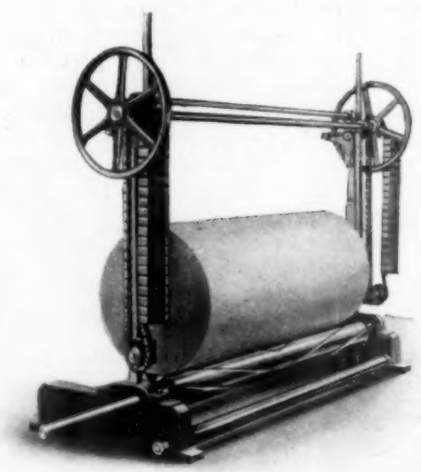
A small factory is producing tires and tubes at Paysandu, but as its participation in the local consumption is so far negligible, imports of tires practically equal consumption.

About 18 makes are represented in the country, which accounts for the highly competitive feature of the local market. The competitors other than the United States and Canadian are British Dunlop, French Michelin, Italian Pirelli, and German Continental. Some few French Bergougnan are sold. The manufacturers who obtain most of the trade operate through their own branches or through distributors who receive stocks on consignment. Dunlop is the only foreign rival which maintains a branch, but the Michelin agent has a warehouse sufficient to store ample stock.

Camachine Roll Winders

FOR winding plain or friction coated rubber or rubber fabrics, artificial leather, canvas, woolens, burlap, oilcloths, etc., the Cameron Machine Company, 61 Poplar Street, Brooklyn, N. Y., has produced a low model rolling up machine, which is shown in the accompanying illustration.

Standard machines are available in widths from 32″ to 92″. In widths not exceeding 62″ it is possible to rewind a roll to a maximum diameter of 48″. In widths between 62″ and 82″ the maximum diameter of rewound roll obtainable is 36″. The machine runs at a fabric speed of 400 feet per minute.



Cameron Low Model Roll Winder

Latest improvements in this machine are a grooved front drum for eliminating wrinkles in the material before it is wound into rolls and a system of counterweights to regulate the hardness of the roll automatically as the roll increases in diameter.

THE KELLY ABRASION MACHINE*

A Description of a New Machine So Designed as to Simulate the Wiping Action in a Portion of the Tire Tread Under Load—Comparisons Made With Other Machines and Actual Road Tests

By A. F. HARDMAN, W. L. MACKINNON AND S. M. JONES
Kelly-Springfield Tire Company

THE abrasion machine described herein is the outgrowth of a need for an abrasion test which will not only forecast road results but, what is even more important, will also give consistent results in different runs of the same stock.

In designing this machine, shown as a whole in Figure 1, an attempt was made to simulate the following factors of road wear:

(a) The application of the rubber to the abrasive surface under an increasing and diminishing pressure.

(b) The application of abrasive surface to only part of the rubber surface.

(c) The wiping action as the tread leaves the abrasive surface.

Description

An idea of the method by which these results are accomplished may best be obtained from a study of the photographs.

In Figure 2, we have an abrasive wheel A rotating in clockwise direction at 1400 R.P.M. The wheel used in development work is an alundum wheel 152 mm. (6″) diameter by 38 mm. (1½″) face, Norton, Grade 3660 J. It has never been changed and by use of an air jet, its pores have been kept sufficiently clear so that tests made several months apart check each other.

Travelling against the abrasive wheel is the sample mounting wheel "B" making 70 R.P.M. On this wheel are mounted four flat pieces of spring steel .5 mm. (.020″) by 76 mm. (3″) by 140 mm. (5½″) with one end securely clamped to the wheel and the other end left free. The sample, in the form of a slab 152 mm. (6″) by 63.5 mm. (2½″) by 6.35 mm. (¼″) is mounted in the clamp as illustrated with the spring forming a backing which applies the increasing and decreasing pressure required. It will be noticed in Figure 3 that the test piece is slightly longer (½″) than the spring, thus providing a very severe wiping action as the end of the piece leaves contact with the abrasive wheel.

*Paper presented before the Rubber Division, A. C. S., Cincinnati, O., September 11, 1930.

Position Ratios

Due to slight differences in the distances between the mounting clamps and the abrasive wheel, it was impossible at first to obtain the same results upon different positions; but a series of tests including 160 test pieces on 10 different compounds, arranged in every conceivable manner, showed that each position bore a constant relation to the others with slight experimental variations. The ratios for the positions as used in all the data recorded were as follows:

No. 1	100
No. 2	82.0
No. 3	92.4
No. 4	96.5

A new type of mounting has since been developed, with adjustable clamps, by means of which it has been possible to make all positions check each other.

Operation

The operation of this machine is very simple with few points at which extraordinary care must be taken. The test pieces are first numbered for position, weighed to one-centigram, then mounted

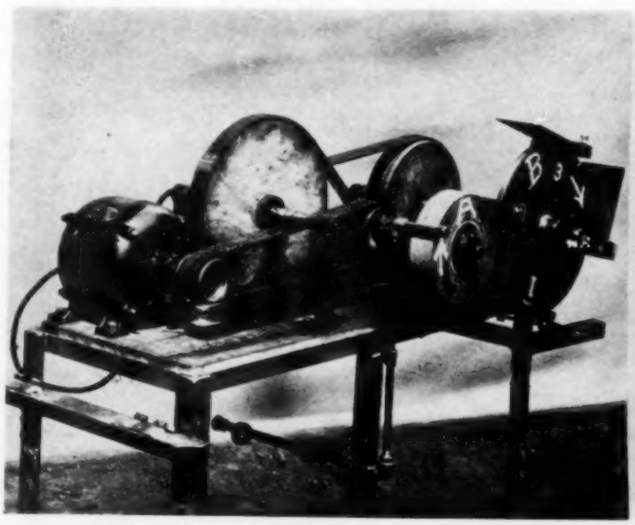


FIGURE 1

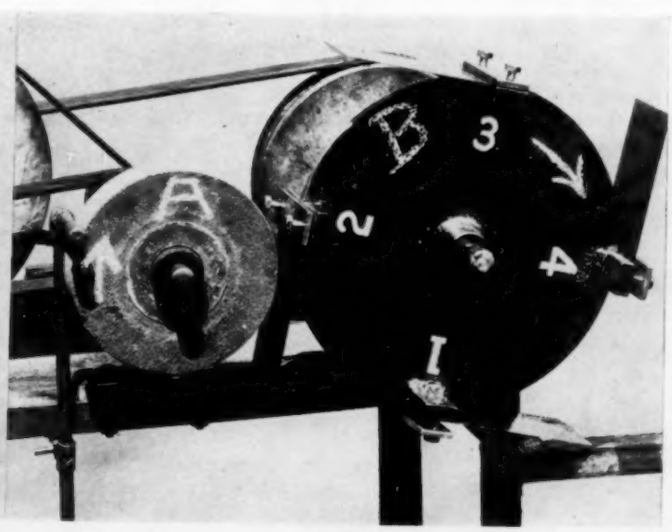


FIGURE 2

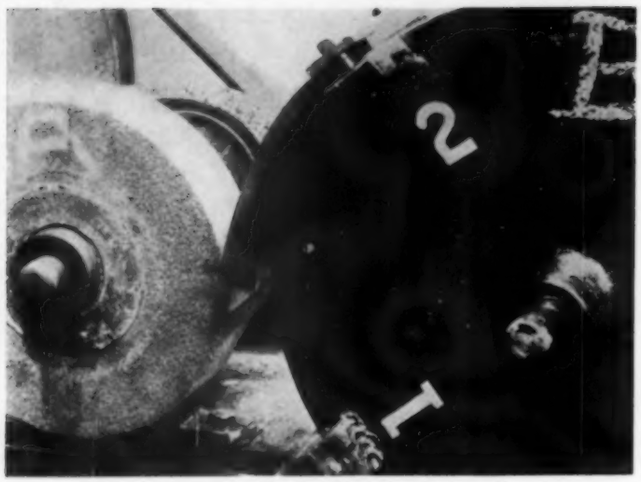


FIGURE 3

firmly but not tightly enough to cause the test piece to lift up from the spring and cause "slapping". It has been found that a ten minute test wears away about 2.5 – 6.5 gms. of stock, amounting to 5 – 10% of the total weight. Since only 35% of the test piece is in contact with the abrasive, and that is only partially worn away, the percentage loss cannot be very large.

Since there are four positions, thus providing four tests within ten minutes, it was decided to run four checks upon each stock. It is recommended that four different compounds be run on each test, and each compound be tested upon each of the four positions. It has been found that the spread of the results is slightly smaller when tests are run in this manner than when all four samples of the same stock are run at the same time; and in addition, this method insures against the loss of all pieces of the stock in case of an unsatisfactory test.

Accuracy

In reporting an abrasion index based upon four tests, some limit must be placed upon the range of results to be included in the reported index. For a test of this kind, it may be conceded that an average of all results within ± 5% of the two closest checks would be quite satisfactory.

In checking the accuracy of this machine, it has been found that 87.5% of all the 524 tests made in this laboratory over a period of four months by several operators fall within the limit of ± 5% of the closest checks.

Calculation of Results

In order to report the results obtained as a comparable index, the actual loss in gms. for each position is divided by the specific gravity of the stock and multiplied by 100 to obtain a convenient figure. These figures are then divided by the position ratios given above and all results falling within ± 5% of the two closest checks are averaged to obtain the abrasion index. This may be defined as the "volume loss in cc. per 1000 minutes on the first position" of the machine. No adjustment has been made for power consumption because for stocks as similar in nature as those compared on this machine, the differences will be small, and in addition it would be quite difficult to measure power consumption on this type of machine.

Sensitivity

In putting this machine to actual use, it has been found to differentiate quite clearly between compounds; in fact, the results exaggerate the differences between stocks to such an extent that the differences must be divided by two to get the actual differences as shown by road tests. That this machine differentiates more clearly between stocks than the machine which had previously been used in this laboratory was clearly shown by the data collected.

Tread Wear Comparison

In the final analysis, however closely the machine checks its own results, and however clearly it differentiates between compounds, it is of no practical value unless it can make an accurate forecast of road wear results. In checking this fact, five experimental compounds were chosen which cover the field of tread quality fairly well, and carefully controlled factory batches of each of these were made up. Treads were tubed from each stock and samples for complete laboratory tests taken from stock directly adjacent to the material actually used in making up sectionally treaded tires. The physical data, including abrasion results on both the old and new machine are shown in Table I.

Table I

Physical Data on Five Treads

Temperature of Cure—274° (Modulus figures taken at 300% elongation)

Compound		20′	30′	40′	50′	60′	70′	80′
A	Tensile	4180	4360	4530	4500	4530	4400	4370
	Elong.	680	640	630	600	600	575	570
	Modulus	1110	1400	1600	1730	1800	1850	1870
	Hardness				65			
	Abrasion		Kelly—171				Grasselli—156	
B	Tensile	4200	4500	4540	4550	4420	4550	4480
	Elong.	700	670	660	640	630	640	620
	Modulus	830	1150	1250	1305	1380	1410	1422
	Hardness				61			
	Abrasion		Kelly—196				Grasselli—186	
C	Tensile	3710	4000	4150	4040	4060	4060	3940
	Elong.	700	665	650	615	605	600	590
	Modulus	940	1250	1365	1450	1530	1530	1550
	Hardness				65			
	Abrasion		Kelly—252				Grasselli—188	
D	Tensile	3360	3520	3500	3560	3540	3540	3410
	Elong.	640	605	580	570	560	545	540
	Modulus	1150	1370	1500	1580	1645	1630	1660
	Hardness				69			
	Abrasion		Kelly—290				Grasselli—255	
G	Tensile	3460	3620	3600	3520	3460	3520	3560
	Elong.	685	640	615	605	590	585	600
	Modulus	965	1150	1275	1290	1320	1360	1350
	Hardness				65			
	Abrasion		Kelly—404				Grasselli—226	

Three treads were used in each tire, compound 'C" being made common to each tire. These tires were cured 70′ at 274° and tested on macadam road after an appropriate ageing period. Groove depth measurements at 5 points in each section were taken daily during these tests of each tire.

In choosing a figure to represent tread wear, it was decided to use the number of miles necessary to wear off .137" of the tread, which represents slightly more than half the groove depth. Figures taken earlier are not sufficiently large to be accurate, while the measurement of groove depth when the groove is well worn is not satisfactory.

Using the values obtained upon compound "C" as a standard of 100 for all tests, the values shown in Table II were obtained upon each compound on the machines indicated.

Table II

Comparison of Abrasion Indices

	Kelly	Kelly (Corrected)*	Road	Grasselli
A	148	124	125	120
B	128	114	111	102
C	100	100	100	100
D	87.4	93.7	78.2	76
G	63.0	81.5	83.8	83

*Corrected by dividing the differences by two.

It will be noted that a fairly accurate evaluation has been made by the Kelly machine in all except one case (D) which has consistently shown better results on the abrasion test than on the road.

In conclusion, it has been our aim to develop a machine which would incorporate in an abrasion test the features of

(a) An increasing and decreasing pressure of contact with the abrasive material.
(b) An application of only part of the surface to the abrasive.
(c) Side slip, as represented in this machine by the loose end of the test piece.

It is believed that this machine will give results consistent enough to breed confidence in their value, and will differentiate twice as clearly between compounds as road tests will. If it can do all we think it can, it should be of interest to many, and it is our hope that others may be able to use our ideas with value to themselves and to the industry.

Appendix

A number of road tests have been completed since the original presentation of this paper, on compounds which have also been tested on the Kelly Abrasion Machine. A comparison of the two tests will be given herein.

All road tests are reported on a percentage basis, using the mile-

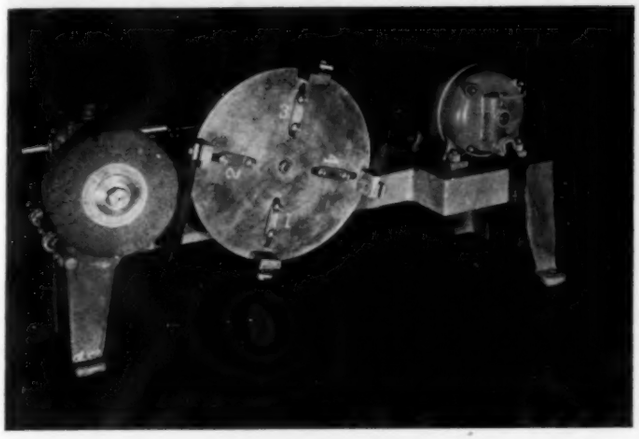


FIGURE 4
The Latest Improved Type of the Kelly Abrasion Machine Which Is Now in Use in the Kelly-Springfield Laboratory. The Cost of the Machine Complete With Standard Motor Is $125

age of one compound in each test as 100%. Two figures are given for most tests, the first being "Mileage to Smoothness" of the tread design as judged by appearance. This figure is, of course, more or less qualitative and unreliable. The other figure given is mileage required to wear off .15" of the tread design. This value is obtained from a graph of daily readings taken at six points on each tire with a depth gauge graduated in thousandths of an inch. Fifteen hundredths of an inch is used in this report as in the preliminary report because it affords a remaining depth sufficiently large in most cases to be accurately measured and yet allows for enough tread wear so that the differences between the two treads being compared may be clearly distinguished.

In addition to the percentage comparison for the Kelly Abrasion Machine figures, the actual abrasion indices obtained are shown in order to bring out clearly the fact that the apparent difference in quality between two treads as run on the abrasion machine must be divided by two to obtain the difference which will result from the road test. The percentage figures are given both corrected and uncorrected for this factor.

The different compounds are simply denoted as A and B for each test, although it is apparent from the abrasion indices that several different compounds are being tested.

Compounds	Mileage to Smoothness	Mileage to Wear off .15" of Tread	Abrasion Index	Abrasion Index Percentage	
			Actual	Uncorrected	Corrected
	1	2	3	4	5
A	100	100	196	100	100
B	94	88	236	83	91.5
A	100	100	275	100	100
B	100	99	277	100	100
A	100	100	275	100	100
B	102.5	104.5	250	110	105
A	100	.....	267	100	100
B	97.5	.....	282	94	77
A	100	100	252	100	100
B	118	125	171	148	124
A	100	100	275	100	100
B	132	120	198	140	120
A	100	100	275	100	100
B	114	120	198	140	120

It will be noted that the corrected percentages as run on the Kelly Abrasion Machine (Column 5) show a remarkable agreement with the road wear percentages shown in Column 2.

It is believed that these added tests which were run without special effort or control of all conditions will furnish adequate evidence of the value of this type of abrasion machine in foretelling actual differences in road wear between various tread compounds.

British Rubber Laboratories

ANOTHER rubber testing laboratory, in addition to the one recently established by the Graesser-Monsanto Chemical Works, Ltd., and described elsewhere in this issue of THE RUBBER AGE, was inaugurated January 22, at Blackley, near Manchester, England, by the Imperial Chemical Industries, Ltd. This makes the second rubber laboratory maintained by chemical suppliers to the rubber industry to go into operation in Great Britain.

The laboratory will be an addition to an existing group of laboratories at Blackley. Like the Graesser-Monsanto laboratory, its services will be at the disposal of any rubber manufacturer who desires advice on questions relating to the uses of chemicals and compounding materials which improve the life and quality of rubber products. Research will also play an important part in the activities of the new laboratory. It is equipped with the latest apparatus for mixing and processing, including calendering, extruding, spreading and curing, in addition to physical testing, abrasion and flexing testing and accelerated aging equipment.

Norman Endurance Belt Testing Machine

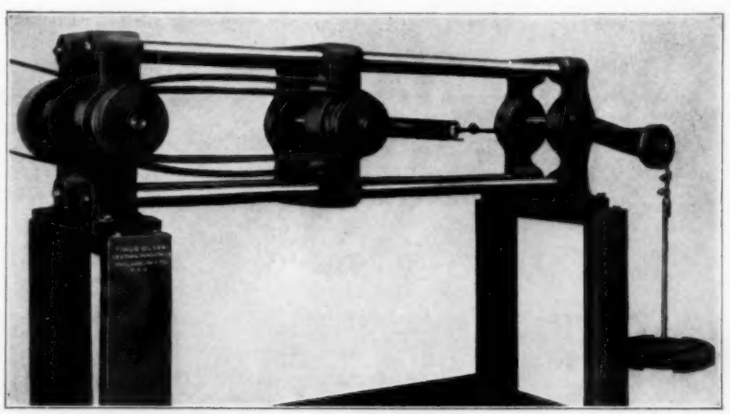
A MACHINE involving some new principles has lately been introduced for testing belts and pulleys. The machine is manufactured by the Tinius Olsen Testing Machine Company, Philadelphia, Pa., and is the invention of Professor C. A. Norman, of Ohio State University. It was first described in a circular entitled, "An Endurance Testing Machine for Belts," published by the University.

The belts tested in the machine run as if they transmitted considerable power but without actually transmitting power to the outside. They are subject to all the conditions of wear and stress which occur in actual power transmission.

The endurance testing of belts is accomplished by adopting the principle of the differential drive, in which one belt acts as a brake on another and absorbs all the power transmitted by the other.

The machine is made in two models, the single machine, as shown in the illustration, equipped to test two belts, and the double machine, for four belts.

The manufacturers claim that the following objections are met by the use of these new machines: the use of more costly and complicated equipment; the large amount of power consumed on most belt testing equipment; the use of power take-off apparatus or dynamometer; the inaccuracies in obtaining the stretch; the laborious method of producing a certain percentage of slip on the belt; and the greater length of time necessary on other belt tests.



Single Model Norman Belt Testing Machine

EDITORIAL COMMENT

"Fatalism, Faddism, and Fact"

INDUSTRY needs the moral support of the general public and that support can be secured only by a wider dissemination of the facts regarding business conditions, by the development of a clearer understanding of the inter-play of economic forces, and by a recognition of the limits of human control over the economic mechanism."

These were among the concluding words of an address by Magnus W. Alexander, president of the National Industrial Conference Board, of New York, before the annual meeting of the Associated Industries of Cleveland at the Hotel Winton. Mr. Alexander's address was entitled "Fatalism, Faddism, and Fact," and was a calm, dispassionate and philosophical review of present business conditions from the standpoint of an expert observer and analyst. It was a strong appeal to reason, based upon fact.

Starting with the assumption that any severe and prolonged business depression will develop certain mental attitudes, the speaker classified these attitudes into three groups which he labelled Fatalism, Faddism, and Fact. "The fatalists sit with folded hands, gloomy, languid, and resourceless; the faddists have a ready remedy for every situation, however difficult; and between these two extremes stand those who have a passion for facts and who base their action in any situation upon what the facts disclose."

"The restoration of public confidence in the future of American industry and commerce," positively declared Mr. Alexander, "is unquestionably the first step toward substantial business recovery. In so far as industry has retained faith in its ability to cope collectively with its problems, even when they are magnified by business depression, industrial relationships have been strengthened and a surer foundation for sound business development has been laid. A fatalistic attitude would be destructive of that cooperation which has been so important an instrumentality in the growth of American industry. Fatalism is indicative of a philosophy of defeatism which contributes nothing toward the recovery of business or the stabilization of economic activity. It represents rather a complete surrender to circumstances over which industry should exercise some control, and runs counter to the philosophy expressed in the wise and potent words of Disraeli: 'Man is not the creature of circumstances. Circumstances are the creatures of men.'"

"If common sense," concluded Mr. Alexander, "can prevail over fatalism on the one hand and faddism on the other, business will soon emerge from its depression."

Forbes on Tire Price Cuts

IN these days of business worries, it is not deemed good taste by THE RUBBER AGE to "knock" the rubber industry. It has had its share of trouble and grief and should be allowed a breathing space. But criticism is sometimes a good thing. And so without comment, editorially we print the following barb leveled at the industry through the columns of *The Forbes Magazine*, from the pen of B. C. Forbes, the well-known business expert. The recent tire price cut has had its protagonist in P. W. Litchfield, and his defence of this action is printed elsewhere in the columns of this issue. Between the two statements there is ample material for a spirited debate. Mr. Forbes' statement follows:

"The writer learned in Akron, rubber capital of the world, weeks ago, that such action was likely, mainly, it was explained, because of the conduct of a mail order house. Ridiculous and incredible though it sounds, rubber manufacturers confess that they are largely at the mercy of this mail order house. Naturally this house and other mail order sellers of all kinds of merchandise are more concerned about being able to attract customers through low prices than they are concerned about the well being of the rubber industry.

"Tires make excellent 'leaders' to attract agricultural and other customers who patronize mail order companies. Therefore it is not a matter of life and death to these retailers of a thousand and one articles whether they make or do not make a fair margin on this particular article.

"But it is a matter of life or death to the vastly important rubber industry, that manufacturers should be able to obtain prices permitting them to pay high wages, maintain reasonable dividends, improve their plants and processes and build up stronger financial structures.

"Are our rubber magnates so animated by personal jealousies and other petty considerations that they cannot muster up enough cooperation and common sense to evolve saner principles and practices? Price cutting, carried too far, becomes throat cutting. The rubber industry is a disgraceful example."

The RUBBER AGE

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Representatives in all the rubber centers of the United States, Canada, England, France, Germany and the Middle East.

The Rubber Industry's CURRENT NEWS

Financial—Personals—New Rubber Products—
Building Operations—Manufacturing—Exports

AKRON RUBBER GROUP ELECTS NEW OFFICERS

Members of the Akron Rubber Group of the American Chemical Society met on the evening of February 9 at the Firestone Clubhouse, Akron, O., and heard three interesting technical papers. Officers were to be elected for the year. A complete account of the meeting will be published in the February 25 issue of THE RUBBER AGE.

Members of the Akron Group have been invited by the Akron-Canton Section of the American Society of Mechanical Engineers to attend the meeting of that body on February 27 at the Central High School auditorium at Akron. At this session, Dr. George K. Burgess, chief of the Bureau of Standards, will talk on the work of that organization. Roy V. Wright, president of the American Society of Mechanical Engineers in New York and editor of *Railway Age*, will also make a short talk.

NEW YORK RUBBER GROUP WILL MEET ON MARCH 11

The New York Group of the Rubber Division, American Chemical Society, is planning its first meeting of the year for Wednesday, March 11, at a location still to be selected. The Group is at present conducting a campaign to increase its membership, and it is expected that many rubber chemists and technologists will be added to its roster in the next few months.

Chairman W. H. Whitcomb has appointed John Parks Coe, of the Naugatuck Chemical Company, as secretary-treasurer and has also announced the following executive committee: John M. Ball, Fred C. Batchellor, F. G. Breyer, John P. Coe, Donald F. Cranor, Harry L. Fisher, R. R. Lewis, Peter P. Pinto and W. L. Sturtevant. This committee met on January 24 at the offices of the Naugatuck Chemical Company.

Rubber Credit Men Meet

The Crude Rubber Group of the New York Credit Men's Association held their annual dinner and theatre party on the night of January 27, dining in the grill of the Paramount Hotel and later attending the performance of "Fine and Dandy." Sixteen members and guests were present. The regular monthly luncheons of the Crude Rubber Group are held on the third Thursday of each month.

Thropp Workers Entertained

William R. Thropp Sons Company, Trenton, N. J., recently entertained its office staff and foremen at a dinner at a local hotel. About 50 persons were present, and gifts were presented and exchanged. John E. Thropp and Joseph R. Thropp were in charge of the party.

CHARLES FRESHMAN HEADS A. SCHULMAN, INC., BOARD

Charles Freshman, former president of the Charles Freshman Radio Company, Inc., makers of radio receiving sets, has been elected chairman of the board of directors of A. Schulman, Inc., dealers and brokers in crude and scrap rubber, with offices at Akron, New York and Chicago. Mr.

CHAS. FRESHMAN

Freshman had previously been in the rubber business for more than 20 years, having entered the trade in 1901.

In 1911, Mr. Freshman became a partner of H. Muehlstein with offices in Akron, but in 1922 he left that connection to enter the newly developing radio industry. The company which bore his name passed in 1929 into the control of the C. A. Earl interests and its name was changed to the Earl Radio Company.

Although born in Chicago, Mr. Freshman moved to New York with his family and was educated at the elementary and high schools there and at the College of the City of New York.

In his new position, he will have direct charge of the New York branch of A. Schulman, Inc., at 1208 Prudence Building, 331 Madison Avenue at 43rd Street.

RUBBER DIVISION, A. C. S., TO MEET APRIL 1 AND 2

The spring meeting of the Rubber Division of the American Chemical Society has been scheduled for the mornings of Wednesday and Thursday, April 1 and 2, with the usual banquet to be held on Wednesday night. These sessions will be held in connection with the general meeting of the American Chemical Society at Indianapolis, Ind., which will extend from March 30 to April 3.

The headquarters of the Rubber Division in Indianapolis will be at the Severin Hotel, while the headquarters of the society itself will be the Claypool Hotel. Several interesting papers have already been promised, and the division expects to have a program of unusual technical importance.

M'CLAREN RUBBER ASKS LOWER FREIGHT RATES

An examiner of the Interstate Commerce Commission held a hearing in the offices of the Chamber of Commerce at Charlotte, N. C., at the end of January on a complaint brought by the McClaren Rubber Company, involving freight rates on crude rubber from New York City to Charlotte.

In addition to seeking more reasonable rates, the McClaren company is asking for a refund on all shipments made within two years prior to the filing of the complaint. This refund, if granted, would amount to about $25,000. The rate per 100 pounds of crude rubber now is 56 cents, and the company is asking that a reduction be made to 42½ or 44½ cents per 100 pounds.

Form Rubber-to-Metal Corp.

The Rubber-to-Metal Corporation has been incorporated with 1,000 shares of no-par stock at Auburn, Ind., to conduct a manufacturing business. The incorporators are R. B. Crane, I. B. Crane and C. M. Brown.

Tank Travels 75 Miles an Hour

A new war tank, designed by Walter J. Christie and powered with a 338-horsepower Liberty airplane motor, showed its ability to travel over a broken field at 45 miles an hour in tests at Linden, N. J., last month. The machine's caterpillar tracks were quickly removed and the tank roared over a paved highway on solid rubber tires at 75 miles an hour. It weighs nearly 10 tons.

Akron Payrolls Up 10%

Akron rubber industry payrolls for the period from January 1 to 22 jumped 10 per cent as compared to an equal period in December, 1930, according to statistics compiled by a special committee of the Akron Chamber of Commerce.

Monsanto Unit in Construction

Work is progressing rapidly on reconstruction of the Everett, Mass., plant of the Merrimac Chemical Company, the New England subsidiary of the Monsanto Chemical Works which was destroyed by fire last March. It is scheduled to be ready for occupancy by October 1 next. Operations now concentrated at the Woburn, Mass., plant will be transferred to Everett, and it is planned eventually to dispose of the Woburn unit.

RUBBER FIRMS EXHIBIT AT BOSTON SHOE SHOW

Several rubber footwear manufacturing companies maintained exhibits of their products at the ninth annual National Boston Shoe Show, held at the Hotel Statler, Boston, Mass., from January 12 to 14. Exhibits of heels and soling material of rubber and rubber compositions were featured, as well as displays of rubber footwear.

Among the exhibitors from the rubber industry were the Cambridge Rubber Company, Dewey & Almy Chemical Company, Davidson Rubber Company, Essex Rubber Company, Hanover Rubber Company, Alfred Hale Rubber Company, Hodgman Rubber Company, Moulded Rubber Sole Heel Company, Quabaug Rubber Company, Stedfast Rubber Company, and United States Rubber Company.

SIMPSON SEES BEGINNING OF UPTREND IN BUSINESS

Business reports for the opening of 1931 fully justify predictions that there will be a steady uptrend throughout the year, according to L. M. Simpson, general sales manager of the United States Rubber Company's Tire Department, Detroit. With a continuing uptrend, 1932 should be one of the most prosperous years business has known, he said. Sales for the first two weeks of January are satisfactorily ahead of the corresponding period for 1930, Mr. Simpson stated, considerable new business has developed and an increase has been noted in the replacement trade.

Mr. Simpson, who has just returned from a business trip throughout the country, expressed himself optimistically regarding business trends generally, commenting particularly on the markedly noticeable confidence evident throughout the West and Pacific Coast. "The dealer organization has been much strengthened by the acquisition of several hundred large independent dealers," he said, characterizing this type of dealer as the backbone of the industry.

Steady employment is indicated by business conditions as they look now, said Mr. Simpson.

DR. CADWELL WILL HEAD U. S. TIRE DEVELOPMENT

Dr. Sidney M. Cadwell has been appointed as director of the Tire Department Products Development Division of the United States Rubber Company at Detroit, Mich. He comes to his new position from the company's General Laboratories at Passaic, N. J., with which he was connected for the past 11 years. The latter part of this time Dr. Cadwell was assistant director of the development department there.

While at the Passaic laboratories, Dr. Cadwell made a special study of the aging of rubber and had much to do with the development of VGB, the first rubber anti-oxidant to be marketed. He helped in the development of a large number of accelerators

S. M. CADWELL

of vulcanization and in several new vulcanization processes. These and other developments are described in a large number of patents issued to Dr. Cadwell and in a considerable number of pending patent applications, as well as in several technical articles of which he is the author.

Born in Bozeman, Mont., Dr. Cadwell spent his boyhood on the Pacific coast and the Hawaiian Islands, traveling as far west as China and as far east as the ancestral home in Vermont. Assuming his own financial responsibilities in 1909, he entered the University of Chicago, where he specialized in chemistry and physics. He received his B.S. degree in 1914 and remained as research asistant to Professor Stieglitz, receiving his degree of Doctor of Philosophy in 1917.

Dr. Cadwell served as a captain during the World War and was attached to the Chemical Warfare Service. Prior to entering the service, he worked on the manufacture of picric acid, an explosive, for the Federal Dyestuffs Corporation, Kingsport, Tenn.

Dr. Cadwell is a member of the American Chemical Society and the American Institute of Chemical Engineering. He has been a member of the executive committees of the New York Rubber Group and the Rubber Division of the American Chemical Society. He is a member of Sigma Xi and Gamma Alpha, honorary scientific fraternities, and has served as counsellor, vice-president and secretary of the national Gamma Alpha organization.

Oak Rubber is Busy

The Oak Rubber Company, Ravenna, O., manufacturer of toy balloons, reported the biggest November business in the history of the organization. This high rate of business held up during December and has not shown any sign of let-down thus far this month. More than 250 workers are now employed in the factory.

Colonial Beacon Oil Loss

The Colonial Beacon Oil Company, the subsidiary of the Standard Oil Company of New Jersey in whose gasoline stations the sale of Atlas tires was originated, reported for the nine months ended September 30, 1930, a net loss of $1,576,360 as compared to a profit before federal taxes of $869,385 in the first nine months of 1929. The loss in the quarter ended September 30 was $260,196, comparing with a profit of $338,877 in the third quarter of 1929.

MAIL ORDER COMPANIES SHOW LOWER EARNINGS

The two Chicago mail order and chain store organizations which are the largest individual distributors of automobile tires in the country show sharply lowered profits for 1930, resulting in the case of one in a heavy deficit after dividends. Sears, Roebuck & Company in the year ended December 31, 1930, earned $14,308,897 as compared to 1929 earnings of $30,057,652. The surplus remaining after dividends was $2,779,937 as against a surplus of $19,132,751 in the year previous.

Montgomery, Ward & Company showed total earnings for the past year of $423,211, comparing with its 1929 profits of $13,434,935. This caused a deficit after dividends of $11,234,342 as against a surplus in 1929 of $1,195,164.

Rubber Stocks Little Changed

Rubber company stocks showed no definite trend in the fortnight, the leading issues closing fractionally higher. Closing prices on February 5, compared with the January 20 close and with the high and low thus far in 1931, follow:

	Last Price		—1931—	
	Feb. 5	Jan. 20	High	Low
Aetna	—	—	4	3⅝
Ajax	—	⅜	½	¼
American Hard Rubber	—	—	—	—
Dayton "A"	—	—	—	—
Falls	—	—	—	—
Faultless	—	—	36½	35
Firestone	—	—	18⅛	17
do. 6% pfd.	58⅞	58½	63	58
Fisk	⅝	¾	¾	½
do. 1st pfd.	—	2½	2⅞	2
General	—	90	95	90
do. pfd.	—	—	87½	83
Goodrich	16¼	16⅛	17⅝	15¼
do. pfd.	—	—	65	60
Goodyear	41¼	40½	47	38⅝
do. 1st pfd.	—	—	85	81
India	—	9⅛	13	9⅛
Intercontinental	—	—	3⅞	2
Kelly-Springfield	1⅝	—	2	1⅝
do. 6% pfd.	—	—	35	35
Lee	—	—	4	3¼
Mohawk	4¾	5	5½	4
do. pfd.	—	—	—	—
Norwalk	—	—	⅝	⅝
Pirelli	—	24	30⅞	31⅞
Raybestos-Manhattan	20½	—	22½	18⅝
Seiberling	4⅞	—	5¾	4⅞
do. pfd.	—	35	40	33
U. S. Rubber	13¼	12¼	13⅞	11⅝
do. pfd.	25½	24	27¼	20¾

EDSEL FORD PREDICTS GREATER TIRE OUTPUT

Edsel B. Ford, president of the Ford Motor Company, was a visitor to Akron on January 24 and 25 and made a tour of the factories of the Firestone Tire & Rubber Company with Russell and Harvey S. Firestone, Jr., both vice-presidents of that organization. Asked about business conditions in both the automobile and tire industries, Mr. Ford said, "Business at this period is probably about normal for the season.

"Both the auto and tire industries have every reason to expect a gradual increase, reaching a considerable peak by March. It is too early in the year to judge accurately the dealers' demands for new autos, but practically all the factory managers are expecting a normal increase throughout the year."

Mr. Ford stated that there will be a considerable increase in his company's demands for original equipment tires this year. Speaking about the reduction in automobile and tire prices, he said, "We have found it stimulates business in the auto industry and have made our cuts with that in mind. The same reasoning should apply to the tire business."

U. S. Expands Fabric Mill

The Winnsboro, S. C., tire fabric mill of the United States Rubber Company is installing 22,000 additional spindles. This will bring the total number up to approximately 100,000 spindles.

Davol Makes Sales Record

The Davol Rubber Company, Providence, R. I., announces that during 1930 more than 25,000,000 of its Anti-Colic Brand nipples were sold. This figure, according to the company, is higher than the sales totals for all other brands combined.

Fire at Baldwin Rubber Plant

Fire which followed an explosion in the warehouse of the Baldwin Rubber Company, Pontiac, Mich., on January 19 caused damage estimated at $25,000. The blast was believed to have been caused by chemicals stored in the place, but the exact cause was not determined. One worker was burned about the face and hands.

General Black Truck Tube

The General Tire & Rubber Company is introducing a new black inner tube for truck tires, which is said to be superior to the usual type of tube in its resistance to internally generated heat. It is understood that a soft carbon is used in the heat-resisting compound developed for this new inner tube. According to the manufacturer, tests have been made in which sections of red molded tubes were spliced to sections of the General black tubes and in all cases the red half of the tube crystallized and went to pieces, while the black half remained intact and flexible.

New Rubber Goods

Converse Embassy Galosh

The newest addition to the line of Chix, the fashion styled galoshes manufactured by the Converse Rubber Company, Malden, Mass., is the Embassy design. It is especially made for the woman who wants something smarter than an ordinary rubber and yet does not care for full height gaiters. Its simple lines and silk sheen finish permit its use with any costume. The Embassy is furnished in two colors, duotone Congo brown and ebony black.

Airian Pneumatic Cushions

As a substitute for the usual spiral springs in automobile seats, Airian pneumatic cushions offer air bags which are claimed to give superior comfort and shock-absorbing qualities. The basic feature of the Airian

cushion is a form of construction which permits the employment of a large volume of air, confined in a single, undivided cell and under very light compression—less than two pounds to the square inch. Two air bags are used in each seat and back. Tubular stays or "grommets" give stability to cushions and permit use under extremely low degree of inflation. The cushions are equally suitable for use in motorboats or for any purpose for which cushion seats or backs are required. The cushions are manufactured by the Seiberling Rubber Company, Barberton, O., but are sold exclusively by the Airian Products Corporation, 233 Broadway, New York City.

Gillette Super Traction Tire

To meet the demand for a tire that would eliminate the use of chains, the Gillette Rubber Company, Eau Claire, Wis., is now offering its Super Traction balloon. The

beveled knobs throw all snow or mud clear, cleaning themselves as they run. Easy riding is also assured on any surface because of the large amount of cushion in the knobs. The six-ply carcass is strong and durable. Every Gillette Super Traction casing is warranted against defects in material and workmanship during its life to the extent that if it fails because of such defects the company will either repair it or make reasonable allowance on the purchase of a new one.

Ralph Jones "Professional" Basketball Shoe

The Servus Rubber Company, Rock Island, Ill., is now offering the Ralph Jones "Professional" basketball shoe, designed by and named after Mr. Jones, basketball coach at Lake Forest Academy and formerly coach of the University of Illinois. It is made in a lace-to-toe pattern, with extra support to arch and a sponge rubber heel. The upper is of heavy white or brown duck with loose lining made without back seams. The black rubber molded vacuum cup sole provides excellent gripping qualities for all sports.

Names in the News

HARRY E. OUTCALT has become associated with the St. Joseph Lead Company in charge of technical service in the Zinc Oxide Department, with headquarters at the company's offices at 250 Park Avenue, New York City. Mr. Outcault has been closely connected with the rubber industry for the past ten years through his work for the New Jersey Zinc Company, and previously with the Roessler & Hasslacher Chemical Company.

P. J. KELLY, advertising manager of the B. F. Goodrich Company, presided over a conference of district advertising and sales promotion staff members, held at Akron, February 3. Those who attended included V. C. CARR, Boston; J. D. KATTENHORN, New York; M. P. VAN PELT, Atlanta; L. B. COOLEY, Akron; A. Y. LUCAL, Chicago, and L. T. GREINER, St. Louis.

GEORGE E. PRICE, JR., of the Goodyear Tire & Rubber Company, was elected president of the Akron Association of Purchasing Agents at the annual meeting of that group on January 20. E. G. HAMMACK, of the B. F. Goodrich Company, was elected secretary, and the directors chosen included W. D. GOHR, of the Firestone Tire & Rubber Company, and CHARLES TRUMMER, of the India Tire & Rubber Company.

JOHN B. SHAUB, assistant general manager of the National Rubber Machinery Company, was elevated to the office of potentate of the Al Koran Temple of the Cleveland Shrine on January 15. He has previously held all of the offices leading to the highest honor within gift of that organization.

K. D. SMITH, manager of the tire development department of the B. F. Goodrich Company, is leaving this month for a three-month trip in Europe to study tire construction in the Goodrich plants there. Forty members of his department held a dinner in his honor at Motor Inn, Akron, O., on January 21.

WILLIAM STEPHENS, general superintendent of the Goodyear Tire & Rubber Company factories at Akron, O., completed 30 years of service with that organization last month.

Goodyear Sales Executives Are Promoted

J. E. MAYL

C. H. WILLIAMS

D. W. SANFORD

J. E. MAYL, manager of the southern sales division of the Goodyear Tire & Rubber Company, Inc., has been appointed sales manager of the tire department and assumed his new duties February 1.

Mr. Mayl will be succeeded as head of the southern division by D. W. Sanford, at present manager of Goodyear's Los Angeles sales branch. And C. H. Williams, well known in rubber industry circles in Akron, will succeed Sanford as head of the Los Angeles organization.

Mr. Mayl joined Goodyear in 1924 following 14 years of sales work with the Firestone Tire & Rubber Company. He joined Goodyear's truck and bus tire sales department and became manager of it in January, 1928. In December of that same year he was made manager of the southern sales division. In his new responsibilities as sales manager of the tire department, Mr. Mayl will report to R. S. Wilson, vice-president and sales manager of the company.

Mr. Sanford, who will shortly take up his residence in Akron, has been manager at Los Angeles for three years and has served in other cities in the west as salesman and branch manager for Goodyear during the past 16 years.

Mr. Williams has been with Goodyear since 1912, serving in the export company organization in foreign fields as well as having been branch manager at Fresno, Portland, St. Louis and Chicago.

J. D. BEEBE will take over the new products division of the B. F. Goodrich Company, according to an announcement by J. H. CONNORS, vice-president and general manager of the mechanical division. Announcement is also made of the appointment of J. F. JOHNSTON to be in charge of anode sales which will come under the jurisdiction of the Miller Rubber Products Company, Inc.

EDWARD W. MILLER, superintendent of the Republic Rubber Company, was presented with an engraved parchment bearing a tribute from the Mahoning Valley Foremens' ssociation and other clubs on January 13. Mr. Miller has for the past eight years acted as chairman of the Y. M. C. A. Industrial Commission of Youngstown, O.

LEE SHOENHAIR, pilot of the Miss Silvertown plane of the B. F. Goodrich Company, made a speaking tour last month, giving talks on aviation at Montreal, Qe., and at Plattsburg, Oneida and Syracuse, N. Y. A heavy snow fall just before his engagement at Plattsburg forced him to leave his plane behind and resort to a dog team and sled in order to be on time.

EDWARD HEINKE, of the publicity department of the Firestone Tire & Rubber Company, spoke on January 14 at a luncheon meeting of the Akron Exchange Club. He discussed the proposals for the relief of Akron's street traffic situation, outlining with the aid of motion pictures the suggested "Plan 12" development.

JOHN MCKEE, JR., Cleveland district sales manager of the United States Rubber Company, discussed the business situation as it applies to the rubber industry in a talk at Youngstown, O., on January 21. He declared that with present improved machinery, 54 men can turn out 10,200 tires every 24 hours. "Everything that is produced in the rubber industry this year will be sold," he said.

M. G. HUNTINGDON, formerly of the sales promotion staff of the B. F. Goodrich Company, has been made sales promotion and advertising manager of the Diamond and Brunswick divisions of Goodrich. He succeeds W. P. MARQUAM, who has resigned to become associated with Henri, Hurst & McDonald, Chicago, Ill., advertising agency.

CLYDE B. MITCHELLA has been appointed general manager of the Adamson Machine Company, Akron, O. Mr. Mitchella comes from the Republic Rubber Company, Youngstown, O., where he was chief engineer for the past five years. Prior to that he was in the engineering department of the B. F. Goodrich Company. Mr. Mitchella received his technical education at the Case School of Applied Science.

Rubber News Around the World

AIR-CORED SOLID TIRES FIND FAVOR IN ENGLAND

In the memorandum submitted to the British Ministry of Transport by the Standing Joint Committee of Mechanical Road Transport Associations, opposing the proposal to make pneumatic tires compulsory, the following statement is included: "Considerable development is taking place in connection with air-cored solid tires, and this development should be encouraged both in the interests of highway authorities and road transport users."

Several years ago Pirelli, Ltd., developed and pioneered the semi-pneumatic air-core tire, and after extensive tests and experiments placed this type of tire on the market. It soon established itself because of its resiliency, which results in savings in maintenance costs of engine, chassis, and body, lower depreciation, and greater protection to loads, while in service it has proved itself economical and contributed to the solution of tire problems in diversified transport demands.

India to Use More Tires

The 160,000 motor vehicles of British India used approximately 423,000 tires during 1930, as compared with a consumption of 483,000 tires in 1929. It is expected that 1931 will show an increase in tire use, and, if each vehicle absorbs an average of 2.8 tires during the year, it will give an ultimate absorption of 448,000 units. Due to the activity of Los Angeles factories and the boycotts organized against British goods, the United States has taken the lead in supplying this market.

Automotive Market Survey

A worldwide survey of markets for automotive equipment has just been commenced by the Automotive Division of the United States Department of Commerce, in cooperation with the 60 foreign offices of that department and 58 consulates located in important foreign trade centres. Comprehensive reports will be received from each of these 118 sources and made available for domestic manufacturers.

Carlisle Expects Improvement

C. H. Carlisle, president of the Goodyear Tire & Rubber Company of Canada, in a letter accompanying dividend checks last month, expressed the opinion that the first quarter of 1931 should show an improvement in the tire and automotive industry. He stated that while general trade conditions were poorer in the last quarter of 1929, the company maintained its relative position in the industry's sales and its profits were better than for the same period in 1929.

Ferguson Factory Burns

The factory of James Ferguson & Sons, Ltd., at Collier's Wood, Mitcham, England, was completely destroyed by fire on January 17. A strong wind and the danger of explosions handicapped firemen, and the plant was practically a total loss. The company specialized in the manufacture of ebonite dust.

British Rim Specifications

The British Engineering Standards Association has revised the British standard specification for dimensions of wheel rims and tire bands for pressed-on tires for motor vehicles. The principal revision consists in the elimination of the 740 mm. size of rim and the inclusion of 26, 28, 30, and 34-inch sizes.

Italian Rubber Merger

The amalgamation of four large rubber manufacturing companies took place in Turin, Italy, a few weeks ago. The name of the new company is Fabbriche Riunite Industrie GommaTurin, with a capitalization of 27,000,000 lire, or approximately $1,421,000. The four manufacturers which are included are Societa Anonima Walter Martiny, Societa Anonima Bergougnan Italiana, Societa Piemontese Industria Gomma ed Affini, and Societa Anonima Lavorazione Italiana Filo Elastico Life, all of Turin.

CAMPBELL USES DUNLOPS IN MAKING SPEED RECORD

Captain Malcolm Campbell used tires specially built by the Dunlop Rubber Company, Ltd., when he set a new world's land speed record of 245.7 miles an hour in his Napier Blue Bird car of 1,450 horsepower at Daytona Beach, Fla., on February 5.

The specially built tires, on 38-inch disc wheels, have an unusually thin rubber tread built upon fourteen-ply canvas and were tested in advance on a special machine for speeds of 300 miles an hour. Captain Campbell showed his confidence in them by not making a change between his two runs over the course. This saved considerable time, as each wheel, complete with tire, weighs 200 pounds and requires three men to change it.

Uruguayan Tire Market

Imports of tires into Uruguay in 1930 numbered approximately 71,000 units, as compared to 64,000 units in 1929 and 86,000 units in 1928. The normal tire consumption of the country for 1931 should reach 85,000, according to Department of Commerce estimates. A small factory is producing tires and tubes at Paysandu, but its output is negligible. American factories and their Canadian subsidiaries control the majority of the business, with some competition from British Dunlop, Michelin, Pirelli and German Continental.

Denmark Has Limited Market For Mechanical Rubber Goods

THERE is a limited market in Denmark for mechanical rubber goods, from 75 to 80 per cent of which are imported, chiefly from the United States, Germany, the United Kingdom and Italy. The limited demand is, of course, due to the fact that Denmark is largely agricultural, and such goods as belting, hose, and packings are not required to the same extent as in highly industrialized manufacturing countries.

Rubber Belting Is Popular

The belting sold in the market consists, for the most part, of transmission belting of a very light and narrow description, and it is interesting to note that, owing to the increased use of electricity in agriculture, the demand has shown a steady increase in recent years, and that the trend has been towards rubber belting. The annual demand for leather belting is below 200,000 crowns in value, whereas last year's imports of balata and rubber belting amounted to 232,000 kilos (884,000 crowns), the greater part being rubber. British and German suppliers compete with United States manufacturers in the belting market, American goods at present being in greater demand. The smaller amounts of conveyor and elevator belting on the market are also supplied by these three countries, but of late the cement industry, formerly one of the largest consumers of conveyer belting, has been using Swedish steel belting.

Although the demand for rubber hose is limited, consumption during the past decade has increased greatly. British manufacturers have a share in the supplies of water hose, and also in pneumatic hose, fire hose, etc., and in oil and gasoline hose, the two last named products coming for the most part from the United Kingdom.

Smaller Market for Packing

In rubber packing materials, for which there has been a declining market in recent years, Germany and the United Kingdom largely share the trade. Rubber printing supplies are also largely in the hands of German and British manufacturers and rubber tiling is chiefly of British origin.

Current Crude Rubber Items

STATE OF PARA REMOVES TAX ON RUBBER EXPORTS

The provisional governor of the State of Para issued a decree on January 27 removing the exportation tax on crude and manufactured rubber. The action has been praised by the Para press as a progressive step, encouraging the development of new plantations and aiding them to compete with production in the Far East.

The removal of the exportation tax will be of considerable advantage to Ford Motor Company interests, which, through their huge concession, are now the chief Brazilian rubber growers.

Exchange Differentials

The adjustment committee of the Rubber Exchange of New York on January 27 fixed the priced differentials between the various grades of Hevea plantation rubber which shall prevail on all deliveries against the new "A" contracts for the month of February as follows: No. 2 crepe (thick or thin) at 20 points; No. 2 ribbed smoked sheets at 20 points; No. 3 ribbed smoked sheets at 38 points; No. 4 ribbed smoked sheets at 63 points; No. 5 ribbed smoked sheets at 88 points; limit of allowance on No. 2 crepe at 25 points; and allowance on rubber delivered in bales at 13 points.

Ceylon Industry Lower

The rubber industry of Ceylon during the first 11 months of 1930 suffered a decline of 6,500,000 pounds in volume and $14,000,000 in value of exports. Most rubber planters have reduced wages 25 to 50 per cent, but as yet few estates have closed entirely.

Arthur W. Stedman

Arthur Wallace Stedman, importer and broker of crude rubber, died last month in his seventy-sixth year. Born on April 11, 1855, Mr. Stedman engaged in the commission business from 1872 to 1875 and then in the shoe manufacturing business until 1891, when he became associated with Geo. A. Alden & Company, crude rubber importer of Boston. He was associated with that firm for many years and also with the New York Commercial Company, New York City, continuing as an importer or broker until his death.

COMPANY ARRANGES TO SELL EUPHORBIA LATEX

The Premier Rubber Corporation has entered into an agreement with an American company for the purpose of exploiting the latex of the Euphorbia tree, according to press reports from Cape Town, South Africa. The Premier company was organized with the object of extracting rubber from the latex at the time when crude rubber sold for about 75 cents a pound.

Investigations over four years have proved that the original reports of experts as to the rubber content of the latex were exaggerated and that the company could not fulfill its contracts in that connection. To extract the rubber is not a profitable proposition, but it has been definitely proved that the latex can be put to industrial uses

Charles E. O'Connell has organized the firm of C. E. O'Connell & Company, 18 Burling Slip, New York City, to engage in a general crude rubber brokerage business. Mr. O'Connell was formerly associated with the J. Frank Dunbar Company.

DR. GEORGE RAE SURVEYS WORLD'S RUBBER SUPPLY

In a paper on "The World's Supply of Rubber," read on January 13 at Birmingham before the members of the Midland Section of the Institution of the Rubber Industry, Dr. George Rae, of Harrisons & Crosfield, Ltd., said that the total area under plantation rubber at the end of 1929 was between 6,600,000 and 7,200,000 acres. Of this total, he said, the area under native rubber in the Netherlands East Indies is variously estimated at between 1,100,000 and 1,700,000 acres. Estimates of the area under Dutch native rubber are based on the exports of this rubber, he explained, and on various opinions as to its average yield per acre and the proportion of its immature to its mature rubber.

"The remaining 5,500,000 acres," he continued, "consist of approximately 3,360,000 acres in estates owned by Europeans and Americans; 510,000 acres in Asiatic owned estates over 100 acres, and 1,630,000 acres in native holdings under 100 acres. About 80 per cent of all the estate rubber trees were tappable; 90 per cent of the native rubber in Malaya and Ceylon was tappable, and probably less than 50 per cent of the native rubber elsewhere was tappable. Owing to the drastic system of tapping pursued by the natives, a portion of their untapped areas must be regarded in the same light as bark reserves of estate rubber."

Dr. Rae estimated 1930 net exports of rubber from producing countries at 820,000 tons as compared to net exports in 1929 of 861,000 tons and actual output in 1929 of 847,000 tons. "Under normal conditions of production," he explained, "exports give a good approximation to output and the stock figures now published will usually indicate any significant divergence between output and export."

Owing to the low price of rubber, he concluded, many estates are now harvesting a restricted crop, more will restrict during 1931, but a considerable number may find it necessary to harvest a full crop.

CEYLON RUBBER EXPORTS LOWER DURING JANUARY

A cablegram to the Rubber Exchange reported net exports of crude rubber from the island of Ceylon during January, 1931, as 6,746 tons, compared with 6,932 tons, during December, and with 7,708 tons exported during January, 1930.

Of this amount, the United States received 4,060 tons; the United Kingdom, 1,748 tons, and all other countries, 938 tons. During December, the United States received 3,902 tons; United Kingdom 1,522 tons, and other countries 1,508 tons.

The advent of the "wintering period" is expected to cut down rubber outputs in Ceylon during February, March and April.

Closing Prices on Rubber Exchange of New York, Inc.

FROM JANUARY 20 TO FEBRUARY 3, 1931

		Spot	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Sales
No. 1 Standard Contract of 10 Tons															
Jan.	20	8.10	8.22	8.30	8.40	8.49	8.60	8.69	8.80	8.88	9.00	9.10	9.20	——	8
	21	8.18	8.17	8.30	8.38	8.46	8.56	8.67	8.76	8.85	8.97	9.09	9.21	——	10
	22	8.12	8.10	8.20	8.30	8.40	8.49	8.59	8.68	8.76	8.87	8.98	9.09	——	26
	23	8.10	8.15	8.22	8.31	8.40	8.50	8.60	8.69	8.78	8.89	9.00	9.11	——	12
	24	8.12	8.15	8.28	8.36	8.44	8.54	8.63	8.73	8.83	8.94	9.05	9.16	——	10
	26	8.00	8.00	8.14	8.22	8.31	8.38	8.45	8.55	8.66	8.77	8.88	8.99	——	48
	27	8.06	7.95	8.15	8.25	8.35	8.43	8.50	8.60	8.70	8.85	8.95	9.05	——	26
	28	8.06	7.95	8.06	8.18	8.30	8.38	8.45	8.55	8.65	8.75	8.86	8.97	——	13
	29	7.93	7.85	8.00	8.10	8.20	8.28	8.35	8.45	8.54	8.65	8.76	8.87	——	31
	30	7.81	7.75	7.90	7.99	8.08	8.17	8.27	8.37	8.48	8.58	8.68	8.78	——	11
	31	7.80	7.75	7.86	7.94	8.03	8.12	8.21	8.30	8.40	8.50	8.60	8.70	——	26
Feb.	2	7.70	7.70	7.80	7.88	7.94	8.02	8.10	8.20	8.30	8.40	8.50	8.60	8.70	27
	3	7.80	7.85	7.95	8.03	8.10	8.18	8.28	8.34	8.48	8.61	8.72	8.84	8.94	19
Old "A" Contract of 2½ Tons															
Jan.	20	——	8.10	8.20	8.30	8.40	8.50	8.60	8.70	8.70	8.90	9.00	9.10	——	14
	21	——	8.00	8.10	8.20	8.40	8.50	8.60	8.70	8.80	8.80	8.90	9.00	——	81
	22	——	8.00	8.10	8.20	8.30	8.40	8.50	8.60	8.70	8.80	8.90	9.00	——	34
	23	——	8.10	8.10	8.20	8.30	8.40	8.50	8.60	8.70	8.80	8.90	9.00	——	37
	24	——	8.10	8.20	8.20	8.30	8.40	8.50	8.60	8.70	8.80	8.90	9.00	——	2
	26	——	7.90	8.00	8.10	8.20	8.30	8.40	8.50	8.60	8.70	8.80	8.90	——	128
	27	——	7.90	8.00	8.10	8.20	8.30	8.40	8.50	8.70	8.80	8.90	9.00	——	37
	28	——	7.90	8.00	8.10	8.20	8.30	8.40	8.50	8.60	8.70	8.80	8.90	——	14
	29	——	7.80	7.90	8.00	8.10	8.20	8.30	8.40	8.50	8.60	8.70	8.80	——	25
	30	——	7.70	7.80	7.90	8.00	8.10	8.20	8.20	8.40	8.50	8.60	8.70	——	36
	31	——	7.70	7.80	7.80	7.90	8.00	8.10	8.20	8.30	8.40	8.50	8.60	——	23
Feb.	2	——	7.50	7.70	7.70	7.80	7.90	8.00	8.10	8.20	8.30	8.40	8.50	8.65*	73
	3	——	7.70	7.90	7.90	8.00	8.10	8.10	8.30	8.30	8.40	8.60	8.80	8.90*	8

*New "A" Contract.

MAIL PLANE WILL TEST RUBBER ICE RESISTERS

During the next two months a National Air Transport mail plane equipped with the recently perfected B. F. Goodrich Company rubber "wing shoes" for the elimination of ice in flight will deliberately seek freezing conditions always avoided by airmen, it was announced recently at Cleveland Airport by Wesley L. Smith, eastern superintendent of the airmail line.

For two years the Goodrich Company's engineering staff and representatives of the air transport company have worked on the problem of preventing the damaging formation of ice on airplanes which has cost the lives of many pilots. The first airplane to be completely equipped with the rubber coverings is now ready for the initial tests, which if successful will mean that another flying hazard is solved.

The coverings, built of special rubber and fabric, are moved by compressed air, and exhaustive tests in a refrigerated wind tunnel constructed by Goodrich in Akron, O., indicate that the device will be successful in actual service. Under certain atmospheric conditions only a few minutes of ice-flying is sufficient to bring an airplane to earth completely out of control.

Cement Firm Ends 80th Year

The St. Louis Rubber Cement Company, St. Louis, Mo., operated by the Hadley Brothers, has just ended its 80th year of business. The firm was established in 1850 by the grandfather of the present operators.

International to Make Tubes

The International Rubber Company, which has just started operations in the first unit of its new factory at Pueblo, Col., intends to enter into the manufacture of automobile inner tubes, according to R. C. Sudbury, president. The company has centered its activities at Denver until now, manufacturing a line of mechanical rubber goods.

Cancel Dinner to Aid Mission

Workers in the tire division of the B. F. Goodrich Company last month decided to cancel a banquet for the winning team in a safety contest and to turn over the $200 scheduled for that purpose to the Akron City Mission. A three-month contest ended recently with the "white team" defeating the "blue team" by one point. The losing team was to have a banquet for the winner, but both groups agreed to turn the money over to the mission for Christmas charitable work instead.

Judson D. Garlock

Judson D. Garlock, master mechanic of the Garlock Packing Company, Palmyra, N. Y., died in that city on January 20. The title and position have been assumed by Almon D. Bristol, formerly assistant master mechanic.

Thomas B. Denton

Thomas B. Denton, vice-president of the Rubberset Company, brush manufacturers of Newark, N. J., died suddenly on January 9 at his home in East Orange, N. J., after a short illness of pneumonia. He had been connected with that company for more than 40 years and was also second vice-president of the Rubber & Celluloid Products Company, a subsidiary organization. He is survived by his widow and one married son.

Dewey & Almy to Build

The Dewey & Almy Chemical Company, Cambridge, Mass., has awarded a contract for the construction of a two-story chemical plant at 4000 East 8th Street, Oakland, Cal. The estimated cost of the new branch factory is $10,000.

Converse Issues Yearbook

The Converse Rubber Company, Malden, Mass., has issued its Basketball Yearbook for 1930, published for free distribution to basketball coaches. The book is 9¼ by 12 inches in size and contains 80 pages of profusely illustrated information on records made in the 1929-1930 basketball season. Photos of all prominent teams are included with outlines of their season's activities.

CALIFORNIA PLANT WINS GOODYEAR SAFETY PRIZE

The Los Angeles unit won the 1930 inter-plant safety contest of the Goodyear Tire & Rubber Company and, therefore, retains permanent possession of the Slusser Safety Trophy, a handsome bronze plaque. The New Toronto plant finished a close second, Gadsden was third, Bowmanville fourth, Wolverhampton fifth, Akron sixth and Australia seventh. The California factory had only 19 lost time accidents last year.

Despite finishing next to last on the list, the Goodyear Akron factories reduced accidents 36 per cent last year over 1929. There were approximately one-fifth as many lost time accidents at Akron last year as there were in 1927.

Another inter-plant safety contest will be conducted in 1931 with eight plants in the race. The new Argentina factory will be entered in the competition.

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LATE MARKET PRICES

RUBBER—COTTONS AND FABRICS—CHEMICALS

NEW YORK, FEBRUARY 4, 1931

RUBBER

Crude

DURING the month of January, the average daily closing price for smoked ribbed sheets on the New York outside market was 8.34 cents a pound. This compares with average prices of 9.05 cents in December and 15.24 cents in January, 1930. Only the months of September and October, 1930, recorded lower averages in the history of the industry.

The price range during the month was the most narrow and stable since last March, varying only between the extremes of 8 and 8⅝ cents a pound. Rumors of a let-down in Akron factory activity toward the end of the month and the start of February have since caused the commodity to drop to 7¾ cents. At this price, crude rubber is at its lowest figure since October 6 and only a quarter-cent above the record low for all time recorded on September 30 and October 1 and 2.

Latest reports show that Malayan shipments dropped slightly to 41,579 tons in January as compared with 41,889 tons in December and are, of course, well under the January, 1930, figure of 52,535 tons.

Prices quoted on the New York outside market at the close on February 4 were as follows:

Plantations—

Ribbed Smoked Sheets—			
Spot-Feb.	.07⅝	@	.07¾
Mar.	.07⅞	@	.07⅞
Apr.-June	.08	@	.08⅛
First Latex, crepe spot	.07⅞	@	.07⅞
Amber Crepe, No. 2	.07⅝	@	.07⅝
Amber Crepe, No. 3	.07¼	@	.07½
Amber Crepe, No. 4	.07	@	.07¼
Brown Crepe, Clean thin	.07¼	@	.07½
Brown Crepe, specky	.07	@	.07¼
Liquid Latex, per gal.	.75	@	.85

Paras—

Up-river, fine	.10¾	@	—
Up-river Medium	**Nominal**		
Up-river Coarse	.07	@	.08
Acre Bolivian, fine	.11	@	—
Caucho Ball, Upper	.07	@	.08
Islands, fine	Nominal		

Centrals—

Central, scrap	—	@	**.07**
Esmeraldas	—	@	**.07**

Balata—

Block, Colombia	**Nominal**		
Block, Ciudad	.31	@	.31½

LONDON MARKET

Standard Ribbed Smoked Sheets—Buyers			
Spot-Feb.		@	3⅞d
Mar.		@	3⅞d
Apr-June		@	4 d

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—Sellers			
Spot	3½	@	3⅝d

Scrap

The increase in demand for scrap rubber was not long lasting, and the market has returned to a state of quietude following the let-down in Akron factory operations at the month-end. Reclaimers are apparently unwilling to increase their stocks before ascertaining more definitely the trend of the industry in general. Late scrap rubber prices follow:

(Prices to Consumer)

Auto tire peelings	ton	23.50	@	25.00
Mixed auto	ton	12.00	@	12.50
Bicycle tires	ton	9.00	@	10.00
Clean solid truck tires	ton	24.50	@	26.00
Boots and shoes	cwt.	1.10	@	1.25
Arctics, untrimmed	cwt.	.90	@	1.00
Inner tubes, No. 1	lb.	.05¼	@	.05½
Inner tubes, No. 2, compounded	lb.	.02½	@	.02¼
Inner Tubes, Red	lb.	.02¼	@	.02⅝
Air Brake Hose	ton	10.00	@	12.00
Rubber Hose	ton	9.00	@	10.00

Reclaimed

Manlufacturers of reclaim experienced an increase in demand for their product during the first half of January with the resumption of five-day operations with longer hours at the leading Akron tire plants. There has been only a slight let-down since in the demand for reclaim, but there is apparently no definite upward trend for consumption as yet. The latest prices, which are fractionally lower, follow:

High Tensile				
Super-Reclaim Black	lb.	.08½	@	.08¾
High Tensile Red	lb.	.08¼	@	.08½
Shoe				
Unwashed	lb.	.06	@	.06¼
Washed	lb.	.08	@	.08¼
Tube				
No. 1 (Floating)	lb.	.08½	@	.08¾
No. 2 (Compounded)	lb.	.07½	@	.07¾
Tires				
Black	lb.	.05¾	@	.06
Black, selected tires	lb.	.06	@	.06½
Dark Gray	lb.	.07	@	.07½
Light Gray	lb.	.07¾	@	.08
White	lb.	.08¾	@	.09
Truck, Heavy Gravity	lb.	.06	@	.06¼
Truck, Light Gravity	lb.	.06¼	@	.06½
Miscellaneous				
Mechanical blends	lb.	.05	@	.05⅛

COTTON and FABRICS

Cotton

THE average daily closing price for spot middling upland cotton during the month of January was 10.275 cents a pound, as compared with average prices of 10.02 cents in December and 17.21 cents in January, 1930. The quotations were more nearly stable than they have been for several months, varying only through a narrow price range.

According to calculations made by A. Norden & Company, a supply of approximately 12,715,000 bales of cotton will be available in this country during the period from January 1 to July 31, as compared with 10,435,0000 in the corresponding months of 1930, showing an increase of 2,280,000 bales. Unless domestic consumption and exports are higher than a year ago, therefore, the carryover in the United States on July 31 will amount to at least 6,800,000 bales compared with 4,530,429 last July.

The high, low and closing prices for the commodity on the New York Cotton Exchange on February 4 were as follows:

	High	Low	Close	Close
		Feb. 4		Jan. 20
Mar.	10.58	10.42	10.55	10.26
May	10.85	10.69	10.82	10.53
July	11.07	10.93	11.06	——

Tire Fabrics

Price quotations for tire fabrics have remained unchanged to a slightly higher in sympathy with the course of the raw commodity. January consumption was higher than that of December, but not quite up to expectations. Late prices follow:

CORD				
Peeler, carded, 23/4/3	lb.	.34½	@	.34¾
Peeler, carded, 23/5/3	lb.	.33	@	.33¼
Peeler, carded, 13/3/3	lb.	.30½	@	.30¾
Peeler, carded, 15/3/3	lb.	.31	@	.31¼
Egyptian, carded, 23/5/3	lb.	.43	@	.43½
Egyptian, combed, 23/5/3	lb.	.47	@	.47½
CHAFERS				
Carded, American, 8 oz.	lb.	.26½	@	.27
Carded, American, 10 oz.	lb.	.26	@	.26½
Carded, American, 12 oz.	lb.	.25½	@	.26¼
Carded, American, 14 oz.	lb.	.25	@	.26
LENO BREAKER				
Carded, American, 8¼ oz.	lb.	.26	@	.32
Carded, American, 10¼ oz.	lb.	.26	@	.32
SQUARE WOVEN				
Carded, American, 17¼ oz. 23-11 ply	lb.	.33	@	.33½
Carded, American, 17¼ oz. 10-ply	lb.	.25	@	.25½

Sheetings

The sheeting market during the past fortnight showed practically no change in price structure, some grades being fractionally lower. Latest quotations, as reported by the Textile Brokers Association, follow:

40-inch, 2.50-yard	yd.	.07½	@	.07¾
40-inch, 2.85-yard	yd.	.06½	@	.06⅝
40-inch, 3.15-yard	yd.	—	@	.07½
40-inch, 3.60-yard	yd.	—	@	.06½
40-inch, 3.75-yard	yd.	—	@	.05¾
40-inch, 4.25-yard	yd.	.05	@	.05⅛

Ducks

Single and double filling ducks again showed declines in price during the past fortnight, but enameling ducks and the hose and belting grade remained firm. The latest price quotations were as follows:

Belting and Hose	lb.	—	@	.24
Enameling	lb.	.22	@	.24
Single filling	lb.	.10½	@	.11½
Double filling	lb.	.12	@	.13

CHEMICALS

PRICE quotations for a number of compounding ingredients and materials used as softeners experienced declines during the past month. Resins, however, were slightly stronger at the end of the period, as were glues and certain other specialties. The introduction of a black truck tube using a soft carbon by one manufacturer and the possibility that other tire companies may follow his lead are the only new developments in the actual use of rubber chemicals and compounding materials.

ACCELERATORS

Organic			
A-1	lb.	.24 @	.27
A-5-10	lb.	.33 @	.36
A-7	lb.	.55 @	.59
A-11	lb.	.62 @	.66
A-16	lb.	.57 @	.61
A-19	lb.	.58 @	.62
A-20	lb.	.64 @	.68
A-32	lb.	.80 @	.95
Aldehyde ammonia, crystals	lb.	.65 @	.70
Aniline oil, drums, f.o.b. works	lb.	.15 @	.16
Captax	lb		
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.42 @	.44½
Diphenylguanidine	lb.	.30 @	.32½
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.37½@	.40
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.58½@	.61
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.37½@	.40
Monex	lb.	3.25 @	--
Oxynone	lb.	.68 @	.80
Phenex	lb.	.75 @	—
Pipsol	**lb.**	**4.50 @**	**4.50**
R & H 40	lb.	.40 @	.42½
R & H 50	lb.	.40 @	.42½
R & H 397	lb.	.75 @	.77½
R-2	lb.	1.95 @	2.15
Safex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Tensilac, No. 39	lb.	.40 @	.42½
Tensilac, No. 41	lb.	.50 @	.52½
Thermio F	lb.	.50 @	.55
Thiocarbanilid, drums	lb.	.25½@	.28½
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.62½
Tuads	lb.		
Ureka	lb.	.75 @	1.00
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.50 @	.60
Zimate	lb.		
Inorganic			
Lead, sublimed blue	lb.	.08¼@	—
Lead, white	lb.	.08½@	.08¾
Litharge, domestic	lb.	.07¾@	—
Magnesia, calcined, light	per 100 lb.	5.35 @	5.45
heavy	per 100 lb.	3.65 @	3.75

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.35 @	.36
Ultramarine	lb.	.06 @	.32
Browns			
Sienna, Italian	lb.	.05½@	.12½
Umber, Turkey	lb.	.04½@	.07
Greens			
Chrome, light	lb.	.30 @	.32
medium	lb.	.31 @	.33
dark	lb.	.34 @	.36
Chromium Oxide, bbl.	lb.	.34½@	.35½
Reds			
Antimony crimson, 15/17	lb.	.40 @	.44
sulfur, free	lb.	.56 @	.66
golden, 15/17 F.S.	lb.	.20 @	.25
Indian English	lb.	.08 @	.11
Domestic (Maroon)	lb.	.11 @	—
Oximony	lb.	.13¼@	—
Red oxide, pure	lb.	.10 @	.12
Smith's 444 Crimson f.o.b. Springfield	lb.	.08¾@	.10
Rub-Er-Red, f.o.b.Easton	lb.	.08¾@	—
Venetian red	lb.	.08 @	.06
Vermillion, quicksilver, English	lb.	1.75 @	1.80
Whites			
Lithopone, Akcolith	lb.	.05 3/5@	.06
Lithopone, Albalith	lb.	.05¼@	.05¾
Lithopone, Azolith	lb.	.05¼@	.05¾
Lithopone, Vanolith	lb.	.05¾@	—
Titanium oxide	lb.	.21 @	—
Titanox B, f.o.b. St. Louis,	lb.	.06½@	.07
Titanox C, f.o.b. St. Louis,	lb.	.07 @	.07½
Zinc Oxide—American Process			
American Azo: ZZZ (lead free)	lb.	.06½@	.07
ZZ (leaded)	lb.	.06⅞@	.06⅞
Horsehead Brand: Special	lb.	.07 @	.07½
XX Green	lb.	.07 @	.07½
XX Red, lead free	lb.	.06½@	.07
Kadox, black label	lb.	.10⅜@	.10⅞
blue label	lb.	.09⅜@	.09⅞
red label	lb.	.08 @	.08½
St. Joe, black label	lb.	.06½@	.07
red label	lb.	.06½@	.07
Zinc Oxide—French Process			
Anaconda, lead free	lb.	.06½@	.07
Anaconda, selected lead free	lb.	.07 @	.07½
White seal	lb.	.11⅝@	.11⅞
Green seal	lb.	.10⅜@	.10⅞
Red seal	lb.	.09⅜@	.09⅞
Yellows			
Chrome	lb.	.16½@	.17
Ocher, French medium	lb.	.02 @	.03
domestic	lb.	.01⅝@	.02

COMPOUNDING MATERIALS

Aluminum Flake	ton	21.85 @	24.50
Ammonia carbonate, lump	lb.	.07½@	.07¾
Asbestine	ton	14.75 @	18.00
Barium carbonate	lb.	.03¼@	.05
Barium Dust	lb.	.05 @	.06
Barytes southern off-color	ton	12.00 @	18.00
Western prime white	ton	23.00 @	—
imported	ton	27.00 @	36.00
Basofor	lb.	.04½@	—
Bentonite	lb.	.02 @	.03
Blacks			
Arrow "Aerfloted"	lb.	.04 @	.09
Bone Black	lb.	.06 @	.12½
Carbon, compressed	lb.	.03½@	.07½
Carbon, uncompressed	lb.	.03½@	.07½
Disperso, f.o.b. Louisiana	lb.	.03½@	—
Disperso, f.o.b. Texas	lb.	.036 @	—
Drop Black	lb.	.06 @	.14
Fumonex	lb.	.03½@	.07½
Excello, compressed	lb.	.04 @	.08
Gastex, f.o.b. Texas	lb.	.03 @	.06
Lamp Black	lb.	.10 @	.40
Micronex	lb.	.04 @	.09
Thermatomic-Thermax	lb.		
Flex	lb.		
P-33	lb.		
United carbon, fob Tex.	lb.	.04 @	.09
Velvetex carbon	lb.	.03 @	.06
Blanc fixe dry f.o.b. works	ton	75.00 @	90.00
Carrara filler	lb.	.01¾@	.02
Catalpo (fact.)	lb.	.02 @	—
Clay, Kaolin, domestic	ton	8.00 @	9.00
Aerfloted, Suprex	ton	8.00 @	20.00
Colloidal	lb.	.05 @	.08
Congaree c. l. f.o.b. mine	ton	9.00 @	—
Dark Blue Ridge	ton		
Dixie	ton		
Langford	ton		
Lexington	ton	10.00 @	22.00
Mineral Flour, c.l. f.o.b. mine	ton	20.00 @	23.00
Par	ton		
Tensulite		15.00 @	—
Glues, extra white	lb.	.25 @	.26
medium white	lb.	.22 @	.24
Magnesia, carbonate	lb.	.08¾@	.11
Mica, white water grnd.	lb.	.06 @	.08
Off color (biotite)	lb.	.05 @	.07
Rotten Stone (powdered)	lb.	.02 @	.05
Soapstone, powdered	ton	15.00 @	22.00
Starch, powdered	cwt.	3.42 @	3.52
Talc, domestic	ton	12.00 @	15.00
Pyrax A	ton		
Whiting, commercial	cwt.	— @	1.00
English cliffstone	cwt.	1.75 @	2.00
Quaker	ton		
Superfine	ton	10.00 @	12.00
Sussex	ton		
Witco	ton	20.00 @	—
Zinc Carbonate	lb.	.09½@	.10½
Zinc Stearate	lb.	.20 @	.23

MINERAL RUBBER

Genasco (factory)	ton	50.00 @	52.00
Granulated M. R.	ton		
Hard Hydrocarbon	ton		
Paradura	ton	62.50 @	65.00
Parmr, solid	ton	28.00 @	48.00
Pioneer. MR, sclid	ton	40.00 @	42.00
Pioneer-granulated	ton	50.00 @	52.00
R & H Hydro-Carbon	ton	27.05 @	29.00
Robertson, MR, solid	ton	34.00 @	80.00
M.R. (gran)	ton	38.00 @	80.00

SOFTENERS

Acids			
Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulfuric, 66 degrees	cwt.	1.60 @	1.95
Tartaric, crystals	lb.	.33 @	.35
Acids, Fatty			
Laurex	lb.	.15 @	.16
Stearex	lb.	.13 @	.17
Stearic, double pressed	lb.	.17 @	.22
Alkalies			
Caustic soda, 76%	cwt.	2.90 @	—
Soda ash, 58% C.L.	cwt.	1.17½@	—
Oils			
Corn, refined, bbls.	lb.	.08¾@	.10½
Cottonseed, crude		.06⅛@	.07
Cycline	gal.	.27 @	.34
Degras (c.l. 100 bbls.)	lb.	.03¾@	—
Less c.l. (10-25 bbls.)	lb.	.04 @	—
Lots less than 10 bbls.	lb.	.04¼@	.04½
Fluxrite	lb.	.05½@	.06½
Palm Lagos	lb.	.05¾@	.06
Niger	lb.	.05⅛@	.05¼
Para-Flux	gal.	.17 @	—
Petrolatum, white	lb.	.08 @	.08½
Pigmentaroil	gal.	.18 @	.23
Pine, steam distilled	gal.	.65 @	.70
destructively distilled	gal.	.54 @	.55
Witco Palm Oil	lb.	.11 @	—
Witco Softener (f.o.b. wks.)	lb.	.02 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06½@	.07½
coal tar	gal.	.05½@	.06
pine, 200 lb. gr. wt.	bbl.	7.00 @	—
Rosin, grade K, 280 lb.	bbl.	@	5.70
Pigmentar	gal.	.18 @	.23
Tar Retort, 50 gal.	bbl.	13.50 @	15.00
Solvents			
Acetone, pure	lb.	.11 @	.12
Alcohol, denatured, No. 1 bbls.	gal.	.40 @	.47
Benzol, 90%	gal.	.21 @	.23
Carbon, bisulphide	lb.	.05½@	.06¼
Carbon, tetrachloride	lb.	.06¼@	.07
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Gasoline, steel bbls.	gal.	.16 @	—
Naphtha, solvent	gal.	.30 @	.38
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Turpentine, spirits	gal.	.41 @	.43
wood	gal.	.37 @	.39
destructively distilled	gal.	.35 @	—
Waxes			
Beeswax, white	lb.	.34 @	.36
Carnauba	lb.	.28 @	.32
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.06½@	.07
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02½@	—
White crude scale 124/126	lb.	.02½@	—
Refined, 125/127	lb.	.03⅝@	—
Refined, 128/130	lb.	.03¾@	—
Refined, 135/137	lb.	.05¼@	—
Refined, 138/140	lb.	.07¼@	—

ANTI-OXIDANTS

Agerite, Resin	lb.		
Powder	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Neozone	lb.		
Oxynone	lb.	.68 @	.80
Resistox	lb.	.54 @	.57
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.66

SPECIALTIES

Sunproof	lb.	.35 @	.37½
Sponge Paste	lb.	— @	.30
Tonox	lb.	.56 @	.60

SUBSTITUTES

Black	lb.	.08 @	.14
White	lb.	.10 @	.16
Brown	lb.	.08 @	.15

VULCANIZING INGREDIENTS

Sulfur Chloride (drums)	lb.	.03½@	.04½
Sulfur flour, Ref'n'd, 100% pure (bags)	cwt.	2.40 @	2.75
Commercial (bags	cwt.	1.75 @	2.10
Vandex	lb.		

TIRES & TUBES
CRUDE RUBBER

STATISTICAL SECTION

AUTOMOBILES
GASOLINE

FINAL figures of the Department of Commerce show that while imports of crude rubber dropped from 560,084 tons in 1929 to 482,082 tons in 1930, the value of these imports fell sharply from $239,178,783 to $139,134,330. This reflects the radical deflation of the price of the commodity during the past year.

English warehouse stocks began a new rise during the past month and reached a new peak for all time at the close of the period. Combined London and Liverpool stocks totaled 124,502 tons on January 31 as compared to 119,558 tons on January 3. Stocks in the Far East are somewhat higher than during the fall, but the amount afloat for Europe and the United States is appreciably less.

Reports from Akron indicate that the comparatively high rate of factory activity with which the year opened has not been continued and that February is likely to see a further slackening up in tire output schedules.

Latest figures covering imports and exports from the leading producing and consuming countries have been added to the appropriate tables in this section.

PLAN OF THE SECTION

The statistics included in this section have been chosen for their constant importance to the rubber industry. The tables are reprinted in the same relative position in every issue, each table being kept current by the addition of new figures as soon as they become available.

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U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Re-exports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Net Imports: Long Tons
1921	185,394	73,772,677	17.76	5,716	2,414,924	18.86	179,678
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1928	439,731	244,854,978	25.03	32,159	18,128,361	25.17	407,572
1929	560,084	239,178,783	19.15	36,485	16,868,733	20.64	523,599
1930	482,082	139,134,330	12.89				
1928:							
Jan.	39,107	30,278,444	34.56	1,988	1,734,990	38.95	37,119
Feb.	33,663	27,763,655	36.82	2,738	2,229,589	36.35	30,925
Mar.	40,611	32,103,042	35.29	3,718	2,587,435	31.07	36,893
Apr.	37,935	27,287,266	32.11	2,272	1,415,024	27.80	35,663
May	31,059	19,058,672	27.39	2,399	1,386,307	25.80	28,660
June	27,765	14,121,219	22.71	2,621	1,400,697	23.86	25,144
July	31,258	14,144,765	20.20	3,087	1,451,446	20.99	28,171
Aug.	31,204	12,860,150	18.39	2,377	1,084,646	20.37	28,827
Sept.	39,835	16,512,019	18.50	3,038	1,384,148	20.34	36,797
Oct.	44,058	18,200,332	18.44	2,405	1,085,407	20.15	41,653
Nov.	36,519	14,878,441	18.19	2,788	1,207,089	18.52	33,731
Dec.	43,511	17,580,966	18.04	2,738	1,165,743	19.00	40,773
1929:							
Jan.	57,564	22,872,943	17.74	3,663	1,773,401	21.61	53,901
Feb.	64,265	24,760,111	17.20	2,955	1,374,783	20.77	61,310
Mar.	50,604	20,380,905	17.98	4,218	2,094,037	22.16	46,386
Apr.	55,725	25,542,726	20.46	3,293	1,624,237	22.02	52,432
May	51,161	24,355,511	21.25	2,386	1,349,690	21.24	48,325
June	41,663	18,799,307	20.14	3,152	1,470,746	20.83	38,511
July	43,944	19,342,147	19.65	3,424	1,590,411	20.73	40,520
Aug.	37,222	16,530,090	19.83	2,644	1,232,217	20.80	34,578
Sept.	34,472	15,214,485	19.70	2,011	861,068	19.11	32,461
Oct.	38,163	16,192,261	18.94	2,614	1,190,510	20.33	35,549
Nov.	43,507	18,189,305	18.66	2,929	1,300,354	19.82	40,578
Dec.	42,952	17,573,330	18.27	2,745	1,007,279	16.38	40,207
1930:							
Jan.	47,496	17,793,563	16.72	3,144	1,077,415	15.30	44,352
Feb.	42,687	14,798,240	15.48	2,280	960,790	18.80	40,407
Mar.	44,976	14,653,243	14.54	3,187	1,192,708	16.71	41,789
Apr.	45,423	14,783,605	14.53	2,688	892,532	14.82	42,735
May	42,692	13,373,282	13.98	3,154	1,085,432	15.37	39,538
June	39,993	12,215,848	13.79	3,125	1,027,136	14.67	36,868
July	35,182	10,553,944	13.39	2,732	736,863	12.04	32,450
Aug.	35,713	9,666,362	12.08	2,194	646,667	13.16	33,519
Sept.	35,380	8,460,812	10.68	1,509	429,789	12.72	33,871
Oct.	46,069	9,893,980	9.59	2,054	348,331	7.57	44,015
Nov.	29,401	5,700,086	8.66	1,296	271,847	9.37	28,105
Dec.	37,300	7,175,242	8.59	2,168	542,197	11.17	35,132

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1923	1924	1925	1926	1927	1928	1929	1930
Jan.	30,106	29,058	29,638	32,196	31,518	34,403	43,002	35,872
Feb.	30,149	25,736	29,761	31,136	30,137	33,702	41,594	32,014
Mar.	36,629	28,385	33,498	32,936	36,141	35,688	44,730	35,134
Apr.	29,085	27,129	34,139	32,696	35,871	32,772	47,521	39,333
May	36,155	25,845	35,322	29,364	34,592	37,333	49,233	39,035
June	24,272	22,753	35,822	28,598	33,801	37,676	43,227	33,890
July	17,685	23,396	36,053	27,577	29,219	37,407	41,526	29,245
Aug.	20,359	28,982	35,909	34,533	33,460	42,927	38,274	30,575
Sept.	17,594	31,497	31,691	32,904	27,214	39,882	34,707	25,288
Oct.	21,321	31,520	29,047	29,836	26,790	40,857	34,800	27,271
Nov.	20,437	27,289	28,853	28,080	26,792	37,461	27,659	23,479
Dec.	31,902	27,199	28,748	26,298	25,492	31,232	23,531	21,493
Totals	305,694	328,769	388,481	366,149	371,027	441,340	469,804	372,628

Figures on Quarterly Basis

Quarter	1923	1924	1925	1926	1927	1928	1929	1930
Jan./Mar.	96,776	87,609	95,263	94,301	99,216	103,558	128,565	101,610
Apr./June	89,498	75,674	104,099	87,109	103,242	108,500	139,292	112,092
July/Sept.	55,621	83,813	99,493	93,793	89,210	117,573	113,746	85,261
Oct./Dec.	68,617	92,656	85,789	83,212	80,860	117,597	84,872	
Totals	305,507	339,752	384,644	358,415	372,528	442,227	466,475	

Note—The Rubber Association estimates its monthly rubber consumption figures to be 90 per cent complete. Up until 1925 the quarterly figures were likewise estimated to be 90 per cent complete; beginning with 1925 an estimate of 92 per cent completeness has been used. These estimates have been used in raising the figures in this table to 100 per cent. The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

U. S. Consumption of Gasoline

(In Barrels of 42 Gallons)

MONTHS	1929	1930	MONTHS	1929	1930
January	22,602,000	25,731,000	July	36,860,000	38,256,000
February	22,776,000	26,509,000	August	37,759,000	37,433,000
March	28,495,000	31,029,000	September	34,193,000	37,823,000
April	32,019,000	34,549,000	October	32,816,000	32,267,000
May	34,117,000	36,497,000	November	31,502,000	30,984,000
June	33,163,000	35,902,000	December	26,550,000	29,094,000

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave
1928																																
October	18⅝	18⅛	18½	18⅝	18⅝	18⅝	—	18⅝	18⅝	18⅝	19	—	—	19⅛	18	17⅝	17⅝	17⅝	19	19	18⅛	18⅛	19	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝
November	18⅛	18⅜	18⅜	—	18⅝	18⅝	—	18⅝	18⅝	18⅝	—	18⅛	18¼	18	18	17⅝	—	18	18	18	18	18	18	18	—	—	17⅝	17⅝	17⅝	17⅝	—	18¼
December	17¾	—	17⅜	17⅝	17⅝	18¼	18	18	—	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	—	—	17⅝	17⅝	18⅛	—	18¼	18
1929																																
January	—	18⅛	18¼	18⅛	18⅛	18⅛	—	18⅛	18⅛	18⅝	20	20	—	20	19¾	20⅝	20¾	20¾	20¾	20¼	—	20⅝	21⅜	22⅝	22	22	—	22½	21⅝	22¾	22¼	20½
February	22	—	—	21⅝	22¾	22¾	22¾	22¾	22¾	—	22¾	25⅝	25⅝	24¾	25⅝	25⅝	25⅝	24⅝	24¾	25¾	25	25⅝	23½	—	26¼	26½	—	—	—	—	—	24
March	26	26	26	26	25⅝	25⅝	25⅝	26¼	26¼	25¾	25¾	25¾	24¾	24¾	24¾	24¾	24¾	24⅝	24¾	23	23	23¼	23	23	23	23	22½	22¾	—	—	—	24¼
April	23	23¼	—	22¼	22¾	22¾	22¾	22¾	22¾	22¾	22¾	22¾	21¾	21¾	21¾	21¾	21¾	21⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	—	—	21⅛
May	19⅝	19⅝	19⅝	19⅝	19⅝	20⅛	20⅛	21⅜	21⅜	21	21	21	20⅝	20⅝	20⅝	20⅝	22⅜	22⅜	23⅛	23⅛	23⅛	22⅝	22⅝	21⅝	21⅝	21⅝	21¾	21¾	21⅛	21⅛	21⅛	21⅛
June	21⅛	21⅝	21⅝	21¾	21¾	21¾	21⅝	21⅝	21⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝
July	20⅝	21	21	21	21¼	21¼	21	21	21	22	22	21⅝	21⅝	21⅝	20⅝	20⅝	21⅛	21⅛	20⅝	20⅝	20⅝	21⅛	21⅛	20⅝	20⅝	20⅝	20⅝	20⅝	21⅛	21⅛	21⅛	20⅝
Aug.	21⅛	21	21	20⅛	20⅝	20⅝	21	21	21⅝	21⅝	21⅝	21⅝	20⅝	21⅝	20⅝	20⅝	20⅝	21⅛	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝
Sept.	21⅛	21	21	20⅛	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝	20⅝
Oct.	19⅝	19½	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝
Nov.	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Dec.	—	16¾	16¾	16¾	16¾	16¼	16¼	—	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	16⅝	—	16¼	16	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	16¼
1930																																
January	15⅜	—	15⅝	15⅝	15⅝	15⅝	15⅝	15	14⅞	14½	14⅝	—	—	14⅞	14⅝	14⅝	14⅝	14⅝	15½	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15¼	15¼	15¼
February	15¼	—	15	15	15⅝	16⅝	16⅝	16⅝	15⅞	15⅞	16	—	—	15⅞	15⅝	15⅝	15⅝	15⅝	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
March	16⅜	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	16	16	16	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
April	16⅛	16⅛	16½	16½	16½	16½	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼	16¼
May	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝	14⅝
June	13¾	13⅝	13⅝	13⅝	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
July	12¼	12	—	10½	10½	10½	10¼	10¼	10¼	10¼	10¼	10¼	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞	9⅞
August	10⅝	9⅝	9⅝	9⅝	9⅝	9	8½	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜	8⅜
September	7½	7⅝	8⅛	8	8	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛	8⅛
October	7⅞	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¼
November	8⅝	—	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝
December	9½	9½	9½	9¼	9¼	9¼	—	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝
1931																																
January	—	8⅝	8⅝	—	8⅛	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝	8⅝
February	—	7¾	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞	7⅞

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1921

Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15
1911	141.30	1915	65.85	1919	48.70
1912	121.60	1916	72.50	1920	36.80
1913	82.04	1917	72.23	1921	16.36

Average Monthly Price per Pound Since 1922

Month	1922 Cents	1923 Cents	1924 Cents	1925 Cents	1926 Cents	1927 Cents	1928 Cents	1929 Cents	1930 Cents	1931 Cents
Jan.	18.82	32.73	25.86	36.71	79.50	38.75	40.25	20.14	15.24	8.34
Feb.	16.12	35.14	25.29	36.01	62.25	38.25	32.75	23.97	15.85	
Mar.	14.53	34.21	22.83	41.00	59.00	41.04	26.82	24.55	15.34	
Apr.	15.99	32.48	22.51	43.64	51.25	40.86	18.97	21.18	14.93	
May	15.25	27.39	18.89	58.47	47.75	40.76	18.99	21.46	14.24	
June	15.11	26.88	18.81	77.26	42.50	37.25	19.59	20.64	12.45	
July	14.67	26.10	22.16	103.16	41.03	34.87	19.40	21.30	11.24	
Aug.	13.93	28.84	26.17	82.99	38.50	35.12	19.46	20.59	9.96	
Sept.	14.44	28.95	27.56	88.88	41.00	33.67	18.47	20.37	8.28	
Oct.	19.78	26.98	31.13	98.01	42.50	34.32	18.83	19.67	8.20	
Nov.	23.88	27.14	34.33	104.80	38.50	37.58	18.26	16.62	9.01	
Dec.	27.42	26.60	37.88	98.51	38.25	40.63	17.97	16.12	9.05	
Average for Year	17.50	29.45	26.20	72.46	48.50	37.72	22.48	20.55	11.98	

London Closing Prices of Ribbed Smoked Sheet

(In Pence Per Pound)

Day	Nov.	Dec.	Jan.	Feb.	Day	Nov.	Dec.	Jan.	Feb.
1	4⅜	4⅝	—	—	17	4⅝	4¼	4⅛	—
2	—	4¾	—	3⅞	18	4⅝	4½	—	—
3	4⅛	4¾	4⅛	3⅞	19	4⅝	4⅜	4⅛	—
4	4⅛	4⅝	—	3⅞	20	4⅝	4⅜	4⅛	—
5	4½	4⅝	4¼	—	21	4⅝	—	4⅛	—
6	4⅛	4⅝	4¼	—	22	4⅝	4⅜	4⅛	—
7	4¼	—	4¼	—	23	—	4¼	4⅛	—
8	4⅛	4¾	4¼	—	24	4⅝	4⅜	4⅛	—
9	—	4¾	4¼	—	25	4⅝	—	—	—
10	4¼	4¾	4¼	—	26	4⅝	—	4⅛	—
11	4⅜	4¾	—	—	27	4½	—	4⅛	—
12	4⅜	4¾	4¼	—	28	4½	—	4⅛	—
13	4⅜	4⅝	4¼	—	29	4⅝	4¼	4	—
14	4½	—	4¼	—	30	—	4⅛	4	—
15	4½	4½	4¼	—	31	—	4¼	3⅞	—
16	—	4⅜	4¼	—					

Average Monthly Price Per Pound

Month	1929 Pence	1930 Pence	1931 Pence	Month	1929 Pence	1930 Pence	1931 Pence
Jan.	9.942	7.471	4.160	Aug.	10.505	4.880	
Feb.	11.875	7.948		Sept.	10.160	4.075	
Mar.	12.135	7.595		Oct.	9.620	4.023	
Apr.	10.490	7.391		Nov.	8.442	4.440	
May	10.717	6.926		Dec.	7.958	4.516	
June	10.580	6.195		Average for Year	10.291	5.926	
July	11.065	5.648					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Day of Month	Jan.	Feb.	Day of Month	Jan.	Feb.	Day of Month	Jan.	Feb.
1	——	——	11	——	——	21	10.40	——
2	10.15	10.45	12	10.00	——	22	10.55	——
3	10.30	10.50	13	10.05	——	23	10.60	——
4	——	10.65	14	10.05	——	24	10.45	——
5	10.15	——	15	10.10	——	25	——	——
6	10.15	——	16	10.15	——	26	10.40	——
7	10.25	——	17	10.15	——	27	10.50	——
8	10.30	——	18	——	——	28	10.40	——
9	10.20	——	19	10.15	——	29	10.40	——
10	10.15	——	20	10.20	——	30	10.50	——
						31	10.45	——

Average Monthly Price Per Pound

Month	1929 Cents	1930 Cents	1931 Cents	Month	1929 Cents	1930 Cents	1931 Cents
Jan.	20.22	17.21	10.27	Aug.	18.62	12.03	
Feb.	20.21	15.62		Sept.	18.83	10.85	
Mar.	20.19	15.13		Oct.	18.46	10.63	
Apr.	20.29	16.39		Nov.	17.53	10.96	
May	19.41	16.43		Dec.	17.28	10.02	
June	18.74	14.48		Average for Year	19.03	13.57	
July	18.62	13.10					

World Stocks of Crude Rubber

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND			AFLOAT			ON HAND AND AFLOAT		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
Jan.	110,244	76,342	126,068	46,441	93,330	65,483	156,685	169,672	191,551
Feb.	108,955	90,058	134,790	48,044	75,790	71,015	156,999	165,848	205,805
Mar.	114,061	100,536	141,848	43,378	67,065	63,646	157,439	167,601	205,489
Apr.	115,083	107,659	148,272	32,783	65,798	63,261	145,866	173,457	211,533
May	105,356	97,192	146,179	33,145	65,793	68,168	138,501	162,985	214,347
June	90,198	92,061	151,485	38,392	54,668	58,657	128,590	146,729	210,142
July	83,242	92,535	152,001	42,943	46,145	58,826	126,185	138,680	210,827
Aug.	65,994	90,769	158,178	54,904	49,423	61,168	123,898	140,192	219,346
Sept.	68,851	84,362	169,607	52,692	58,758	60,923	121,543	143,120	230,530
Oct.	66,421	88,483	184,701	45,646	59,180	51,122	112,067	147,663	235,823
Nov.	61,956	92,219	189,925	75,502	62,358	52,538	137,458	154,577	242,463
Dec.	66,166	118,609	203,221	92,037	62,388	56,035	158,203	180,997	259,256

(Rubber Manufacturers' Association figures raised to 100%.)

STOCKS IN GREAT BRITAIN

Stocks in London

(No. of Tons in Wharves and Warehouses, including Latex)

At end of	1928	1929	1930	At end of	1928	1929	1930
Jan.	66,524	25,191	60,434	July	35,429	30,080	81,048
Feb.	62,964	25,554	64,557	Aug.	32,084	35,605	80,931
Mar.	58,272	28,214	68,923	Sept.	31,440	42,188	83,329
Apr.	53,425	31,368	74,676	Oct.	24,207	47,803	77,647
May	44,628	31,290	77,312	Nov.	17,775	52,454	76,887
June	38,756	31,025	80,260	Dec.	19,815	54,304	

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1930					
September	81,830	82,233	82,648	83,136	
October	81,544	82,245	83,102	82,218	
November	77,480	75,159	76,042	76,448	76,670
December	76,877	77,493	77,460	77,328	
1931					
January	78,042	78,761	79,261	80,194	81,039

Stocks in Liverpool

1930				
September	31,159	31,796	34,085	34,858
October	36,378	37,244	37,211	38,345
November	38,941	39,336	40,003	40,492	39,933
December	40,349	40,281	40,300	40,593
1931				
January	41,516	41,814	42,270	42,171	43,463

STOCKS IN PENANG AND SINGAPORE

(Stocks held by Dealers—Quantities in Long Tons)

End of	1928	1929	1930	End of	1928	1929	1930
Jan.	25,868	29,617	39,727	July	18,663	33,859	45,459
Feb.	22,867	32,373	44,371	Aug.	18,971	30,834	48,132
Mar.	20,538	29,437	45,657	Sept.	14,898	32,138	44,015
Apr.	16,946	26,474	48,473	Oct.	12,149	33,770	39,930
May	17,437	30,764	44,715	Nov.	29,188	30,963	41,674
June	18,207	30,403	42,451	Dec.	32,895	35,548	45,963

STOCKS IN OTHER CENTRES

1930 End of	Malaya Mainland	Afloat for Europe	Holland	Colombo	Para and Manaos
Jan.	44,740	28,440	2,134	5,400	3,668
Feb.	41,955	28,180	2,159	5,000	4,370
Mar.	39,206	27,510	2,220	4,759	4,578
Apr.	39,758	23,580	2,204	4,000	4,482
May	26,482	22,730	2,308	4,000	4,388
June	36,578	20,920	2,316	3,856	4,588
July	38,311	27,290	2,312	4,500	4,665
Aug.	39,482	30,310	2,196	5,200	4,489
Sept.	39,863	31,000	2,343	5,334	4,854
Oct.	38,587	27,630	2,378	5,600	5,156
Nov.	40,551	24,220	2,405	5,400	4,535
Dec.	40,919		2,569	5,189	5,132

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total	Per Cent Balloons		Total	Per Cent Balloons
1923	23,140,620	0.6	1927	19,700,003	79.1
1924	21,863,311	19.7	1928	24,247,282	81.6
1925	26,001,664	66.8	1929	24,141,502	80.3
1926	24,199,524	78.8	1930	17,364,096	80.1
1930			1930		
January	1,601,326	84.0	July	1,449,161	80.7
February	1,653,421	78.9	August	1,504,187	78.1
March	2,061,999	79.1	September	1,052,109	80.2
April	2,339,834	81.1	October	863,579	73.3
May	2,010,067	84.3	November	920,435	72.2
June	1,338,226	83.5	December	567,355	69.1

U. S. Tire and Tube Statistics

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928	1929
Production	40,932	45,259	51,633	60,845	61,237	64,439	77,944	68,726
Shipments	39,987	45,204	50,120	59,262	59,002	64,059	74,296	69,395
Inventory[2]	6,132	5,772	7,427	8,142	10,456	10,264	13,624	11,838

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
Jan.	5,358	6,301	4,485	5,394	6,211	4,406	9,949	12,855	11,924
Feb.	6,363	6,479	4,555	5,031	4,951	4,195	11,721	14,525	11,410
Mar.	6,819	7,049	4,863	5,731	6,289	4,717	12,889	15,329	12,513
Apr.	6,178	7,391	5,648	5,812	6,838	5,089	12,717	15,870	13,076
May	6,759	7,636	5,717	6,457	6,735	5,216	13,024	16,733	13,432
June	6,692	6,847	5,122	7,117	6,800	5,294	12,162	16,497	13,277
July	6,498	6,320	3,991	7,895	7,364	5,447	11,157	15,034	11,812
Aug.	7,469	5,693	4,166	8,403	7,354	5,175	10,034	13,337	10,848
Sept.	6,802	4,460	3,365	7,145	5,623	4,405	9,705	12,070	9,812
Oct.	7,326	4,611	3,582	5,717	4,649	3,499	11,520	12,042	9,803
Nov.	6,075	3,378	2,654	4,998	3,355	2,834	12,579	12,127	9,595
Dec.	5,605	3,057		4,591	3,237		13,624	11,838	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1922	1923	1924	1925	1926	1927	1928	1929
Production	50,850	60,116	70,706	82,614	76,618	70,823	80,180	68,829
Shipments	49,673	59,072	68,016	81,004	71,591	72,896	77,127	70,592
Inventory[2]	7,643	8,425	11,052	11,313	16,200	13,692	16,117	12,807

Figures for Recent Months

	PRODUCTION			SHIPMENTS			INVENTORY		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
Jan.	5,441	6,109	4,607	6,072	6,789	4,857	12,982	14,424	12,704
Feb.	6,895	6,346	4,634	5,431	4,948	4,337	14,650	15,936	13,036
Mar.	6,231	7,000	4,941	5,731	6,317	4,727	15,573	16,641	13,179
Apr.	6,661	7,157	5,510	5,702	6,716	4,848	16,638	17,000	13,784
May	7,168	7,181	5,535	6,300	6,598	5,074	17,702	17,745	13,852
June	6,953	6,542	4,950	7,136	6,515	5,265	17,159	17,294	13,612
July	6,674	5,793	3,939	8,729	7,605	5,855	14,974	15,311	11,657
Aug.	8,343	5,481	4,796	9,350	7,672	5,762	13,931	13,072	10,737
Sept.	7,103	5,190	3,817	7,154	5,859	4,541	13,543	12,585	10,065
Oct.	6,929	5,000	3,951	5,662	4,689	3,472	15,235	12,802	10,517
Nov.	5,592	3,544	2,680	5,002	3,480	2,788	15,743	12,845	10,313
Dec.	5,184	3,484		4,858	3,404		16,117	12,807	

(1) Rubber Manufacturers' Association figures, raised to 100%. The Association estimates its figures to be 75% complete up until 1929 and 80% complete beginning with 1929, and that basis has been accepted when preparing the statistics in this table.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States			Canada			Grand Total
	Total	Passenger Cars	Trucks	Total	Passenger Cars	Trucks	
1924	3,600,918	3,203,049	397,869	135,246	117,765	17,481	3,736,164
1925	4,265,704	3,760,459	505,245	161,389	139,311	22,078	4,427,093
1926	4,298,799	3,808,753	490,046	205,002	164,483	40,609	4,503,891
1927	3,393,887	2,938,868	453,019	179,426	146,850	32,556	3,573,313
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929							
Jan.	402,154	350,617	51,537	21,501	17,164	4,337	423,655
Feb.	466,084	407,589	58,495	31,287	25,584	5,703	497,371
March	584,733	513,266	69,559	40,621	32,833	7,788	625,354
April	620,656	538,679	81,977	41,901	34,392	7,509	662,557
May	603,969	516,055	86,596	31,559	25,129	6,430	635,528
June	545,252	453,956	91,296	21,492	16,511	4,981	566,744
July	500,331	427,213	73,118	17,461	13,600	3,861	517,792
Aug.	499,629	444,711	54,918	14,214	11,037	3,177	513,843
Sept.	415,332	365,651	49,681	13,817	10,710	3,107	429,149
Oct.	380,011	321,195	58,816	14,523	8,975	5,548	394,534
Nov.	217,570	170,928	46,642	9,424	7,137	2,287	226,994
Dec.	119,950	92,717	27,233	5,495	4,426	1,069	125,445
TOTAL	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930							
Jan.	273,089	235,099	37,990	10,388	8,856	1,532	283,477
Feb.	346,940	297,483	49,457	15,548	13,021	2,527	362,488
March	401,378	336,178	64,200	20,730	17,165	3,565	422,108
April	442,630	375,171	67,459	24,257	20,872	3,385	466,887
May	417,154	362,784	54,370	24,672	21,251	3,421	441,826
June	335,475	289,704	45,771	15,090	12,194	2,896	350,565
July	262,363	222,700	39,663	10,188	8,556	1,632	272,551
Aug.	223,046	187,288	35,758	9,792	6,946	2,846	232,838
Sept.	216,877	175,720	41,157	7,957	5,623	2,334	224,834
Oct.	150,044	112,800	37,244	4,541	3,206	1,335	154,585
Nov.	135,752	102,957	32,795	5,407	3,527	1,880	141,159
Dec.	155,601	124,070	31,531	5,622	4,225	1,397	161,223
Total	3,354,870	2,814,349	540,521	154,192	125,442	28,750	3,509,062

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA[1]							DUTCH EAST INDIES[4]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon[2]	India & Burma[3]	Sarawak[4]	British North Borneo[5]	Siam[4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China[3]	Amazon Valley	All Other[6]	World Total[7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,955
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	517,528
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1928:															
Oct.	24,476	12,603	11,873	3,999	864	949	564	457	5,295	7,474	10,124	513	1,399	732	44,243
Nov.	68,135	10,436	57,699	8,005	1,048	772	564	425	4,950	7,902	7,805	943	1,790	623	92,526
Dec.	66,763	11,122	55,641	7,848	1,113	744	565	294	5,120	8,792	10,896	948	2,220	588	94,769
1929:															
Jan.	52,546	13,415	39,131	8,301	1,664	873	600	461	5,640	8,067	11,076	850	2,134	642	79,439
Feb.	47,926	12,103	35,823	7,064	1,117	955	600	495	6,572	7,511	10,384	807	2,104	520	73,952
Mar.	49,448	14,553	34,895	6,583	1,413	758	601	499	5,515	6,620	10,629	658	2,332	786	71,289
Apr.	49,816	11,414	38,402	5,097	727	747	548	306	5,997	6,645	11,321	673	1,950	569	72,982
May	43,960	15,593	28,367	5,723	800	966	548	453	6,264	6,961	13,437	1,059	1,922	733	67,233
June	40,398	14,344	26,054	5,563	1,122	1,061	547	422	5,582	6,693	11,270	757	1,398	548	61,017
July	46,454	15,071	31,383	5,457	974	1,247	641	462	6,422	7,192	13,995	575	1,457	543	70,348
Aug.	50,441	15,469	34,972	6,079	685	993	641	431	4,644	7,298	10,782	1,032	1,563	499	69,619
Sept.	53,484	12,392	41,092	7,993	384	832	640	406	4,708	7,517	10,149	655	1,566	504	76,446
Oct.	47,937	12,516	35,421	8,381	812	1,047	671	485	4,697	8,295	10,512	893	1,606	445	73,265
Nov.	46,279	11,204	35,075	6,660	1,065	668	672	278	4,760	6,711	9,380	771	1,442	535	68,017
Dec.	46,147	15,018	31,129	8,683	900	930	672	320	5,189	8,279	11,102	966	1,674	443	70,287
1930:															
Jan.	52,535	11,773	40,762	7,741	1,560	791	642	386	5,709	7,831	8,920	856	1,837	585	77,620
Feb.	48,947	12,960	35,987	7,825	1,245	847	642	469	6,900	7,191	11,414	944	1,797	480	75,741
Mar.	47,320	13,236	34,084	6,269	1,129	976	642	391	5,796	6,612	11,070	643	1,674	536	69,822
Apr.	45,517	16,331	29,186	5,030	856	1,026	502	366	4,802	6,326	12,582	433	1,201	630	62,940
May	49,388	36,135	13,253	5,947	975	917	502	350	6,352	6,661	11,916	753	1,383	555	49,564
June	36,657	12,120	24,537	4,152	778	1,040	201	392	4,728	4,776	9,512	425	974	551	52,066
July	41,347	12,759	28,588	4,619	792	1,087	600	327	6,022	5,891	9,770	648	810	418	59,572
Aug.	47,982	10,304	37,678	6,779	600	740	600	335	5,982	7,197	9,520	394	809	382	71,016
Sept.	48,529	8,087	40,442	7,920	343	680	600	289	5,960	6,358	7,302	527	1,093	400*	71,914
Oct.	47,770	7,312	40,458	7,388	591	598	650	300	5,916	6,956	6,352	667	669	400*	70,945
Nov.	41,420	7,566	33,854	5,835	264	631	600*	311	5,334	6,401	8,001	654	658	400*	63,543*
Dec.	42,086	9,671	32,415	6,934	800*	976	600*	335	6,254	7,196	8,476	721	1,365	400*	66,472*

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, and 2,670 in 1929. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons 1924, 6 tons 1925, 20 tons 1926, about ½ ton in 1927, and 1 ton in 1928. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons 1924, 2,239 tons 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, and 1,302 tons in 1929. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands. This figure includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. *Figure is provisional; final figure will be shown immediately it becomes available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States[1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,399
1921	179,736	42,087	15,135	21,920	8,124	21,718	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,012
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,178
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,808
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,015
1928:															
Oct.	41,667	—934	3,728	4,386	2,943	3,711	1,049	98	766	696	141	527	250	318	59,346
Nov.	33,846	—3,141	3,278	3,694	2,799	2,150	1,340	689	837	544	31	337	252	282	46,938
Dec.	40,781	8,438	3,633	2,470	2,618	3,002	1,145	1,378	755	639	148	435	263	206	65,905
1929:															
Jan.	53,922	11,951	5,645	4,711	3,759	3,776	1,481	956	1,061	749	218	638	179	525	89,571
Feb.	61,331	5,179	5,001	4,613	2,908	2,727	1,259	684	1,131	627	113	226	115	356	86,270
Mar.	46,391	9,068	4,409	4,586	4,961	2,630	1,515	716	725	931	316	354	80	409	77,091
Apr.	52,520	8,295	4,854	5,351	3,177	2,308	1,407	703	1,518	750	144	956	40	445	82,478
May	48,475	5,112	3,152	3,682	2,937	2,314	1,417	996	1,437	854	201	468	37	277	71,359
June	38,821	4,787	6,814	3,948	3,075	1,593	1,624	695	2,215	672	687	507	24	520	65,882
July	41,114	4,993	4,839	3,559	3,205	2,388	2,023	1,056	2,918	1,039	253	519	30	465	68,401
Aug.	35,397	14,594	4,645	4,082	2,879	3,663	908	1,234	724	902	254	429	25	319	70,055
Sept.	32,912	17,010	3,889	4,691	1,908	3,511	1,224	1,235	853	672	253	361	91	477	68,453
Oct.	36,040	16,111	4,489	3,355	1,821	3,902	1,838	1,073	1,125	1,147	278	710	91	201	72,181
Nov.	41,097	13,141	3,082	3,776	2,709	3,221	1,275	1,226	1,453	361	253	595	62	313	72,564
Dec.	40,588	12,434	4,274	2,921	2,114	2,251	1,198	1,200	726	741	52	677	90	443	69,709
1930:															
Jan.	44,911	11,106	4,207	3,862	2,842	2,805	910	826	332	612	209	552	200*	577	73,949
Feb.	40,792	10,293	4,482	3,697	2,250	1,386	1,385	2,705	457	1,143	188	315	200*	239	69,533
Mar.	42,216	12,346	4,354	4,289	3,776	2,663	1,083	1,153	975	678	358	322	200*	263	74,676
Apr.	43,036	13,058	5,006	4,488	2,303	2,769	2,067	929	673	1,431	158	461	200*	255	76,790
May	40,012	9,861	5,233	4,379	2,593	2,699	1,279	1,645	64	1,250	230	274	200*	282	65,620
June	37,374	9,645	4,458	3,794	2,579	2,677	1,378	1,574	67	691	343	507	200*	282	65,620
July	32,785	7,650	3,311	3,449	3,347	1,206	587	567	84	939	172	756	200*	342	55,395
Aug.	34,513	8,369	3,953	3,515	2,108	2,170	886	149	265	888	37	747	200*	450	58,250
Sept.	34,373	16,015	5,285	4,089	1,578	2,606	1,279	1,373	414	824	221	817	200*	411	69,485
Oct.	44,385	9,095	6,728	3,747	1,942	3,951	2,460	2,782	609	709	439	1,132	200*	351	78,590
Nov.	28,437	250		3,074	2,128		2,510				364	1,180	200*		
Dec.	35,202	12,249													

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]United States imports of guayule are included in this compilation. *Figure is provisional; final figure will be shown immediately it becomes available.

Domestic Production of Miscellaneous Rubber Goods

	Rubber Proofed Fabrics	Rubber Heels	Rubber Soles	Mechanical Goods Shipments
	Yards	Pairs	Pairs	Dollars
1924	25,020,000	186,279,000	(1)	$48,615,000
1925	23,988,000	206,970,000	16,211,620 (2)	64,877,000
1926	29,328,000	183,312,000	12,253,000	76,789,000
1927	37,872,000	201,014,000	27,160,000	68,625,000
1928	41,179,000	235,170,000	37,645,000	69,114,000
1929	50,731,000	232,126,000	34,499,000	74,770,000
1929:				
December	2,291,000	14,781,000	3,003,000	4,751,000
1930:				
January	3,281,000	15,470,000	3,496,000	5,169,000
February	3,441,000	14,172,000	2,338,000	5,376,000
March	3,570,000	15,439,000	2,582,000	5,981,000
April	4,029,000	17,762,000	2,593,000	5,989,000
May	3,597,000	15,603,000	1,939,000	6,163,000
June	3,379,000	15,795,000	2,754,000	5,318,000
July	2,940,000	15,117,000	2,663,000	4,910,000
August	3,458,000	13,735,000	1,473,000	4,552,000
September	5,046,000	14,322,000	2,193,000	4,083,000
October	5,209,000	16,460,000	3,056,000	4,186,000
November	2,822,000	11,083,000	1,426,000	3,400,000

(1) Not available; (2) Last 9 months only.

Source: "Survey of Current of Business of the Department of Commerce."

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All quantities in Long Tons)

	Guayule		Balata		Jelutong		Liquid Latex (1)	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
1919	1,430	760,690	727	937,038	8,332	2,213,964	—	—
1920	758	345,985	1,064	1,260,043	5,672	2,068,501	—	—
1921	58	26,945	814	1,077,859	1,745	351,893	—	—
1922	127	57,040	812	978,765	2,335	403,812	—	—
1923	1,155	542,227	700	898,524	4,565	853,308	—	—
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,443	517	574,750	6,749	1,642,531	3,853	3,537,810
1926	4,805	2,562,096	354	327,213	7,263	3,127,757	3,388	4,680,386
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,116	876,077
1928	3,075	1,755,685	731	430,855	7,552	2,540,059	4,167	2,185,579
1929	1,231	545,175	728	565,964	8,203	2,458,136	3,728	1,787,997
1930	1,096	347,388	501	422,684	5,907	1,403,244	4,449	1,506,804
1930:								
Jan.	150	55,272	28	28,549	509	141,384	407	194,703
Feb.	75	25,956	52	45,319	367	93,087	311	158,843
Mar.	148	50,007	16	12,498	522	128,844	279	107,847
Apr.	75	19,856	58	54,548	410	103,089	226	98,239
May	172	57,760	17	13,645	602	144,415	749	242,385
June	168	51,561	52	47,000	532	120,424	389	129,368
July	93	26,000	24	17,468	45	102,325	242	78,688
Aug.	50	14,000	11	5,800	766	168,511	944	253,127
Sept.	100	28,000	45	39,512	486	86,564	402	127,751
Oct.	64	18,527	36	30,702	490	113,638	306	99,637
Nov.	—	—	73	61,650	389	84,219	332	65,265
Dec.	—	—	90	66,198	429	116,644	70	20,481

(1) Latex import figures not available before 1924.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

	Consumption					Consumption			
Year	Production	Tons	% to Crude	Stocks*	Year	Production	Tons	% to Crude	Stocks*
1920	86,395	75,297	38.4	.....	1925	132,930	137,105	35.6	15,203
1921	36,725	41,351	24.1	.....	1926	180,582	164,500	45.9	23,218
1922	57,834	54,458	19.3	.....	1927	189,144	178,471	47.6	24,980
1923	74,766	69,534	22.7	.....	1928	208,516	223,000	50.4	24,785
1924	80,079	76,072	22.4	.....	1929	218,954	226,588	48.4	27,464
1928:									
Jan.	14,862	20,140	58.5	21,941	July	17,278	19,070	51.0	17,305
Feb.	15,291	18,670	55.4	20,845	Aug.	19,049	17,890	41.7	15,881
Mar.	17,069	20,680	57.9	19,558	Sept.	18,693	17,795	44.6	17,991
Apr.	15,393	19,280	58.8	19,283	Oct.	17,182	18,420	45.1	17,026
May	18,945	20,215	54.1	18,137	Nov.	18,245	18,380	49.1	22,399
June	18,781	18,140	48.2	18,709	Dec.	17,728	14,320	45.9	24,785
1929:									
Jan.	18,685	21,068	49.1	24,394	July	18,387	20,236	48.7	19,679
Feb.	18,094	19,829	47.7	23,305	Aug.	19,787	18,230	47.6	22,309
Mar.	19,984	20,867	46.7	22,076	Sept.	18,660	17,071	49.2	24,984
Apr.	19,899	22,435	47.3	20,680	Oct.	18,865	18,744	53.8	25,117
May	20,385	23,176	47.1	19,479	Nov.	14,363	15,320	55.4	26,080
June	18,416	18,141	42.0	17,980	Dec.	13,429	11,531	49.0	27,464
1930:									
Jan.	15,019	17,454	47.6	24,241	July	12,322	12,384	42.3	23,873
Feb.	15,848	14,559	44.5	24,243	Aug.	12,047	10,985	35.9	22,980
Mar.	17,400	15,241	42.2	24,415	Sept.	11,433	10,480	41.4	21,996
Apr.	17,828	16,904	42.0	24,587	Oct.	12,349	10,724	39.3	21,145
May	17,812	17,052	42.7	23,356	Nov.	10,763	8,816	37.5	24,007
June	15,714	14,063	40.3	24,449	Dec.	.....	.....	.....	.....

*Stocks on hand at the end of month or year. Exports of reclaimed rubber, not shown in this table, amounted to 8,540 tons in 1927, 9,577 tons in 1928, and 12,369 tons in 1929.

(Rubber Manufacturers' Association figures raised to 100%)

REVIEW DESK

Books, New Publications, Catalogues, Etc.

INDUSTRIAL RESEARCH LABORATORIES OF THE UNITED STATES. Compiled by Clarence J. West and Callie Hull. Published by the National Research Council of the National Academy of Sciences, Washington, D. C., 1931. 267 pp. $2.

That industrial research is making progress in the United States seems apparent from this fourth edition of what has become a standard work of reference in its field. In its pages are listed more than 1,600 laboratories of industrial companies as compared with 1,000 in the third edition of 1927. There are between 110 and 120 laboratories listed whose activities include research in connection with rubber and many others whose work affects the rubber industry through studies relating to chemicals, textiles and other fields. In each case, the names of the directors of the laboratories are given, together with the number of chemists, physicists and other workers employed and the exact scope of activities undertaken. The volume is concluded with an index of directors of research, a geographical index and an index of subjects.

INSTRUCTIONS FOR AUTOMOTIVE EXPORTERS. Published by the Automotive Division of the United States Department of Commerce, Washington, D. C. 1930. 16 pp. For free distribution.

The purpose of this pamphlet is to guide automotive exporters and their shipping brokers in properly listing and classifying automotive apparatus and supplies when preparing their shipper's export declarations.

FIRST AID IN SMALL INDUSTRIAL PLANTS. Published by the Policyholders Service Bureau, Metropolitan Life Insurance Company, 1 Madison Avenue, New York City. 1930. 20 pp. For free distribution.

SAFETY ACTIVITIES IN SMALL COMPANIES. Published by the Policyholders Service Bureau, Metropolitan Life Insurance Company, 1 Madison Avenue, New York City, 1930. 16 pp. For free distribution.

Efforts to assure the health and safety of workers should not be confined to the larger industrial plants, and these booklets detail methods which have proved valuable in connection with the small industrial unit. Such activities do not necessarily involve considerable expense, as the authors of these little handbooks show, but may be very effective in results.

METALLURGISTS AND CHEMISTS' HANDBOOK. Compiled by Donald M. Liddell. Published by the McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York City. 1931. 847 pp. $5.

This is the third edition of what has been a popular reference work since 1916. A pocket size volume, it includes all the tables, formulae, constants and standard reference data the chemist and metallurgist constantly require. Included in its contents, for example, there are 90 pages of chemical data, 208 pages of physical constants, 8 pages of organic chemistry, 55 pages on sampling and analysis, 53 pages of mathematical data and tables and 9 pages of first-aid data.

A DIRECTORY OF AMERICAN AIRCRAFT ENGINES. Published by the International Nickel Company, 67 Wall Street, New York City. 1931. 72 pp. For free distribution.

The aviation engine is an offspring of the automotive industry, and the history of all automotive progress, according to the publisher, is in large measure the history of the development of alloy steels. This volume presents a page on each of 65 engines with a photographic reproduction, information on such important points as type, rating, weight, fuel and oil consumption, special features and nickel alloy parts employed in construction.

VITRIFIED GLAZED TILE ASH STORAGE TANKS. Published by the United Conveyor Corporation, Old Colony Building, Chicago, Ill. 1930. 20 pp. For free distribution.

Storage tanks for ashes make an asset out of a liability, permitting them to be easily sold. This catalog describes such equipment with copious illustrations.